SANMOTION

CLOSED LOOP STEPPING SYSTEMS

Model No.PB

Ver.3

SANYO DENKI

English

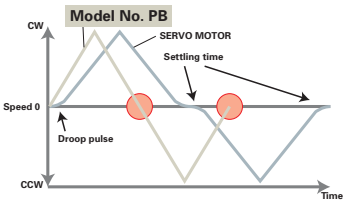
Hybrid system combining the ease-of-use of stepping motors with the reliability of servomotors.

SANMOTION CLOSED LOOP STEPPING SYSTEMS Model No.PB

MERIT 1 Increased System Speed and Smaller System Size

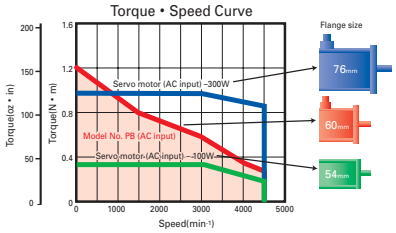
High Speed Positioning

High torque performance in the low speed range delivers shorter positioning time for short stoke/high hit rate applications.



Smaller System Size

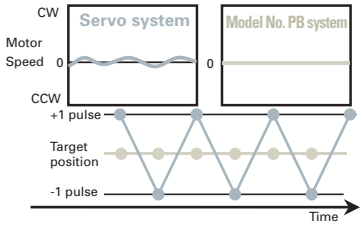
Smaller system size is achievable for low speed applications due to the availablity of higher torque performance in the low speed range as compared to conventional servomotors.



MERIT 2 Stable Stand-Still

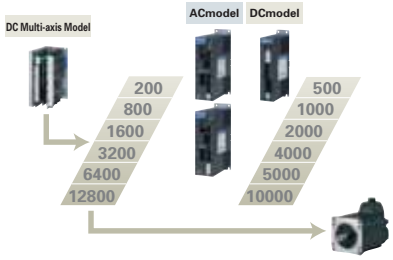
Stable Stand-Still

Complete stand-still motion is possible due to the availability of holding torque, a typical characteristic of stepping motors.



High Resolution

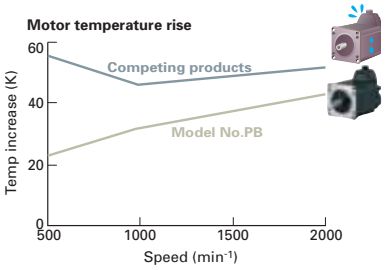
The position resolution can be subdivided for higher positioning precision.



MERIT 3 Energy-Saving

Improved Efficiency from Current Control

Higher efficiency from low heat generation is achieved by controlling the current flow to motor according to motor load.

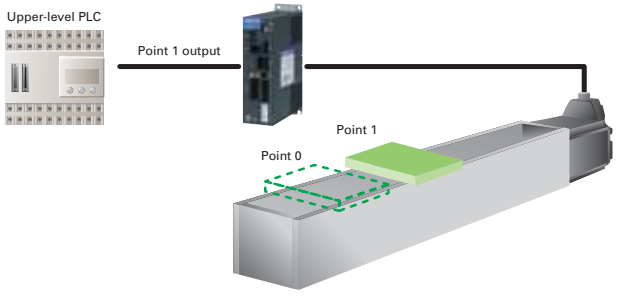


MERIT 4 Simplified Control

General Purpose I/O Input

AC Type R | DC Type M | DC Type R Multi Axis

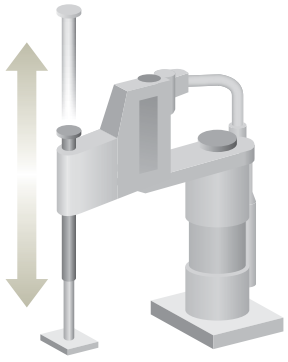
System can be easily controlled by using the general purpose I/O to designate preset point or program numbers (up to 256 points).



Support For Various Operations

AC Type R | DC Type M | DC Type R Multi Axis

Comprehensive built-in amplifier functionality includes thrust control, point designation, programming, homing, holding brake control and sensor limit input.



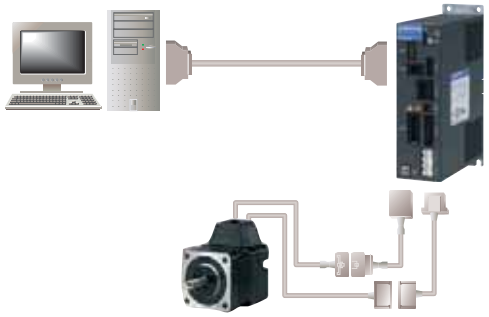
AC Power Input	DC Power Input
AC Type R General Purpose I/O Input Type (RS-485 + PIO)	DC Type M Multiple Input Type (General Purpose I/O Input + Pulse-Train Input)
AC Type P Pulse-Train Input Type	DC Type R Multi Axis General Purpose I/O Input Type (RS-485 + PIO)

MERIT 5

Reduced System Design Cost and Time

Wide Availability of Optional Cables and Connectors

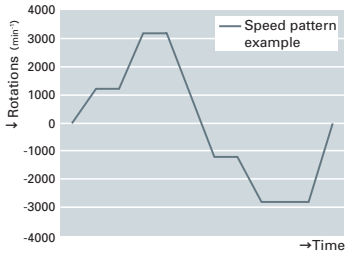
Cables and connectors for controller/amplifier and amplifier/motor connection are available for hassle-free setup.



Built-in Pulse Generation Function

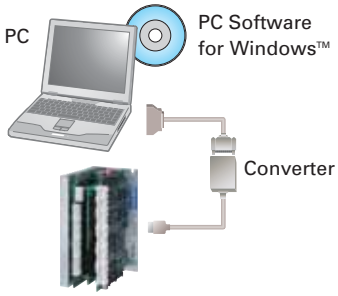
AC Type R / DC Type M / DC Type R Multi Axis

A built-in pulse generation function is included in the Model No. PB Types R and M. The amplifier receives speed, acceleration/deceleration and distance as numeric data from the upper-level device, and automatically generates an optimal speed pattern according to the commands internally.Since no separate pulse generator is required, this contributes to lower system cost.



PC Interface

Parameter setting, data editing and monitoring of position and speed can be done on a PC using the bundled setup software.

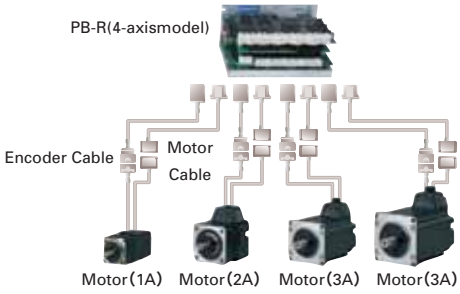


Multi-Axis Type (DC Power Input)

DC Type R Multi Axis

Multi-axis systems can be reduced in size and weight using the PB-R 4-axis type.

※ 1,2,3A can be selected using software switches.



MERIT 6

Complies with International Safety Standards

CE cULus Compliant

Extensive Closed-Loop Stepping System Lineup

SANMOTION CLOSED LOOP STEPPING SYSTEMS Model No.PB

How do you want to control the equipment?

The Model No. PB Series offers 3 types of control methods.

Point Command Control using PLC I/O	Network Control using Serial Communication (RS-485)	Control using a Pulse Generator

Power Source

AC Power Source | DC Power Source

Power Source

DC Power Source | AC Power Source

AC Power Source

Type R

- **Startup via I/O**
  Startup preset points or programs in the amplifier memory using the I/O.
- **Startup via Serial Communication**
  Control by transmitting speed, acceleration/deceleration and distance data via serial communication.

DC Power Source

Type R Multi-Axis

- **Startup via I/O**
  Startup preset points or programs in the amplifier memory using the I/O.
- **Startup via Serial Communication**
  Control by transmitting speed, acceleration/deceleration and distance data via serial communication.

DC Power Source

Type M

- **Startup via I/O**
  Startup preset points or programs in the amplifier memory using the I/O.
- **Startup via Serial Communication**
  Control by transmitting speed, acceleration/deceleration and distance data via serial communication.
- **Motion is generated by responding to pulse input commands from an upper-level controller.**

AC Power Source

Type P

- **Motion is generated by responding to pulse input commands from an upper-level controller.**

Standard Model

The standard model includes an amplifier and a motor

Motor Flange Size

AC □42 (1.65in) □60 (2.36in) □86 (3.39in)

DC □28 (1.10in) □42 (1.65in) □60 (2.36in)

▶ P23

Low-backlash Gear Model

This model includes a low-backlash gear that engages the final stage with a tapered gear.

Motor Flange Size

AC □42 (1.65in) □60 (2.36in)

DC □42 (1.65in) □60 (2.36in)

▶ P25

REDUCTION GEAR RATIO 1/3.6 1/7.2 1/10 1/20 1/30

Spur Gear Model

This model utilizes a spur gear design for gear reduction.

Motor Flange Size

DC □28 (1.10in)

▶ P29

REDUCTION GEAR RATIO 1/3.6 1/7.2 1/10 1/20 1/30 1/50

Harmonic Gear Model

The harmonic gear provides high torque and eliminates backlash.

Motor Flange Size

AC □42 (1.65in) □60 (2.36in)

DC □28 (1.10in) □42 (1.65in) □60 (2.36in)

▶ P31

REDUCTION GEAR RATIO 1/30 1/50 1/100

Electromagnetic Brake Model

This model uses a non-excitation electromagnetic brake, capable of maintaining positionand supporting a load in vertical operation, even when power is off

Motor Flange Size

AC □42 (1.65in) □60 (2.36in)

DC □28 (1.10in) □42 (1.65in) □60 (2.36in)

▶ P33

Model Nomenclature

❑System Model Nomenclature

PB A R 60 3 - C 3.6 B

- Motor Option 3: Holding Brake (B: included) Note1
- Motor Option 2: Gear Ratio Note1
- Motor Option 1: Gear Specifications Note1
- Motor Length
- Motor Flange Size (in mm)
- Interface Type R: RS-485+PIO P: Pulse Stream M: Multi
- Power Input A: AC Power Source D: DC Power Source
- System Name PB: Model No.PB System

Note 1: No symbol indicates no options.

Note 2: Power(39.37inch) and I/O (39.37inch) cables are included in the set models.

❑Amplifier Model Nomenclature

PB3 D 003 R 1 00

- Specification Identification 00: Standard
- Encoder Type 1: 200P/R INC 2 : 500P/R INC
- Interface Type R: RS-485+PIO P: Pulse Stream M: Multi
- Motor Excitation Current 001: 1A 002: 2A 003: 3A
- Power Input A: AC Power Source D: DC Power Source
- Series Name PB□ : Model No.PB Amplifier

❑Motor Model Nomenclature

PBM 42 3 F X E 20

- Specification Identification 20: Standard
- Encoder Type E : 500P/R with C-phase output
  A : 200P/R No C-phase output
  C : 200P/R with C-phase output
  (DC (Multi-axis) only)
- Options ∗Contact us for assistance
  X : without option
  C : 24V DC Break
  GA to GL : with Gear
  HJ to HM : with Harmonic Gear
- Power Input F: AC Power Source, DC Power Source (Single-axis)
  D: DC Power Source (Multi-axis)
- Motor Length
- Motor Flange Size (in mm)
- Series Name PBM: Model No.PB Motor

∗Please enquire separately for the sizes of PBM503 and PBM565.

Motor Option Combination Table

	Motor Option Combination Table		
Motor No.	Gear Box	Harmonic Gear	Electromagnetic Brake
PBM282F □ E20 / PBM282D □ A20	○	○	△
PBM284F □ E20 / PBM284D □ A20	×	×	△
PBM423F □ E20 / PBM423D □ A20	○	○	○
PBM603F □ E20 / PBM603D □ A20	○	○	○
PBM604F □ E20 / PBM604D □ A20	×	×	○

Motor Standard Specifications (common to all models)

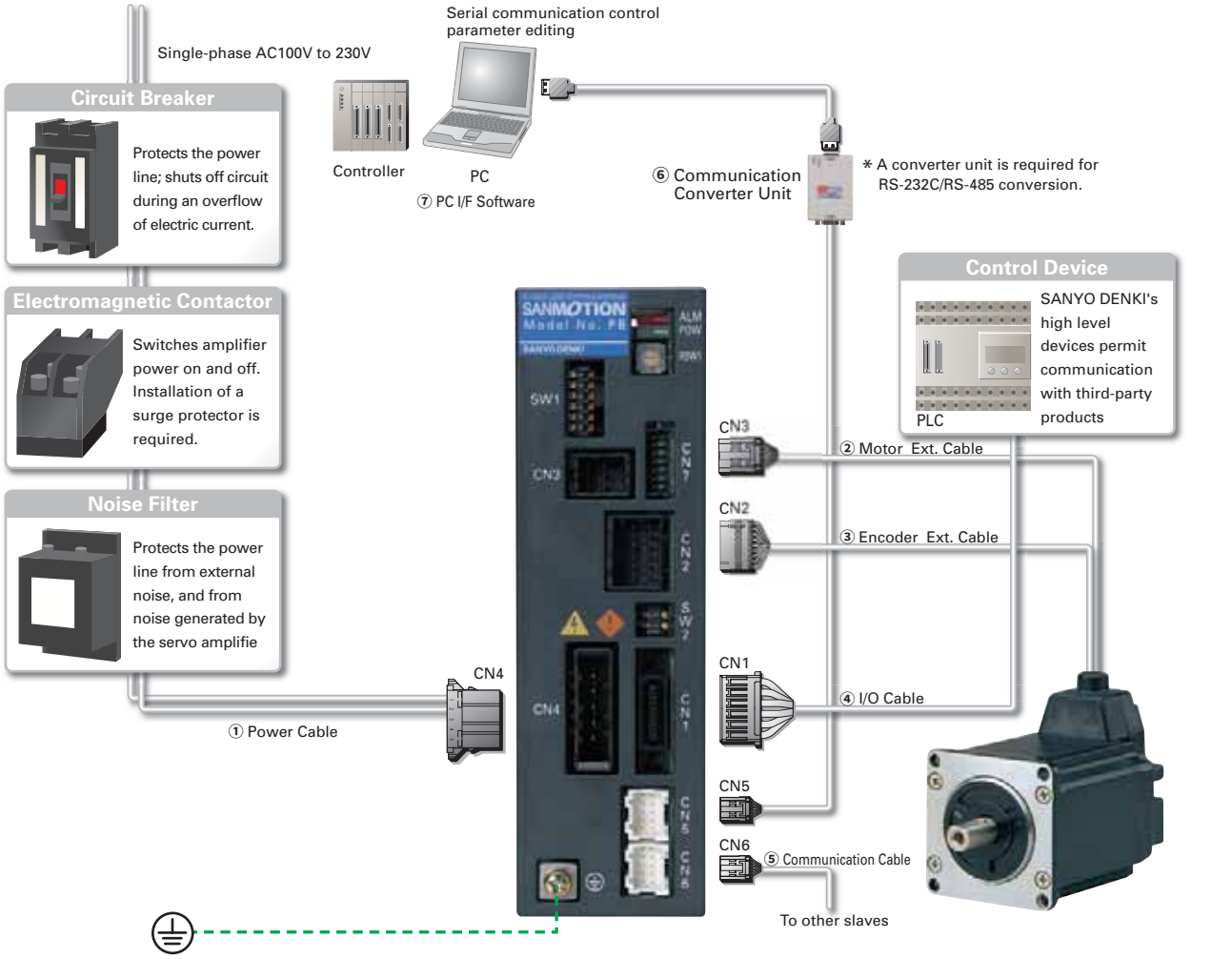
Motor No.	PBM423F, PBM603F, PBM604F, PBM861F, PBM862F	PBM282D, PBM282F, PBM284D, PBM284F, PBM423D, PBM603D, PBM604D
Insulation class	Class B (130℃)	
Withstand Voltage *	AC1500V 50 ／ 60Hz 1minute	AC500V 50 ／ 60Hz 1minute
Insulation resistance *	DC500V 100MΩMIN.	
Degrees of protection	IP40	
Vibration resistance	15 G (Frequency range 10 to 70Hz amplitude 0.060inch 70 to 2000 acceleration 15G)	
Impact resistance	30G(half sine wave with 11 ms duration) The x, y and z are each tested three times for each direction for a total of 18 tests.	
Ambient temperature	-10℃ to + 40℃ (Harmonic Gear Model 0℃ to + 40℃)	
Ambient humidity	20 to 90%RH (No Condensation)	

* The user should not test the insulation resistance or insulation withstand voltage, because a capacitor has been inserted between the encoder output groundline and the frame to prevent noise.

Model No. PB Type R　Single-Axis Type

AC Power Input Type

System Configuration

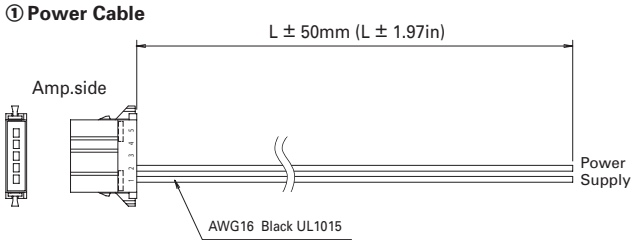


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC7P0010A 1m (39.37in)	PBC7P0000A	2m (78.74 in)	–
② Motor Ext. Cable	PBC6M0030A 3m (118.11in)	PBC6M0000A	20m (787.40 in)	Use when an extension of 50cm (19.69in) or more is required.
③ Encoder Ext. Cable	PBC6E0030A 3m (118.11in)	PBC6E0000A	20m (787.40 in)	Use when an extension of 50cm (19.69in) or more is required.
④ I/O Cable (unshielded)	PBC1S0010A 1m (39.37in)	PBC1S0000A	2m (78.74 in)	–
⑤ Communication Cable	PBC6C0003A 30cm (11.81in)	PBC6C0000A	100m (3937.01 in)	Use when multiple axes are connected in a daisy-chain configuration for communication.
⑥ Communication Converter Unit	PBFM-U5	Main Body Model.No：232485CFP01-01 Cable Model.No：PBC4T0005A		RS-232C／RS-485 Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBA1W-01	–	–	Software for operational check and parameter setting

Optional Cable

① Power Cable

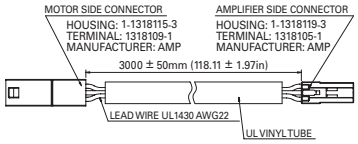


PIN No.	LEAD COLR	
1	Black	AC1
2	Black	AC2
3	—	—
4	—	—
5	—	—

Connector Set : PBC7P0000A

Manufacturer	Type	Qty.
AMP	Housing : 1-178288-5	1
	Contact : 1-175218-5	5

② Motor Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

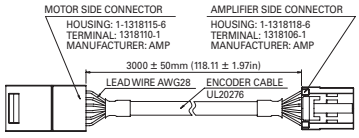
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

Connector Set : PBC6M0000A

Manufacturer	Type	Qty
AMP	Housing : 1-1318115-3	1
	Terminal : 1318109-1	6
	Housing : 1-1318119-3	1
	Terminal : 1318105-1	6

③ Encoder Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	—
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	—

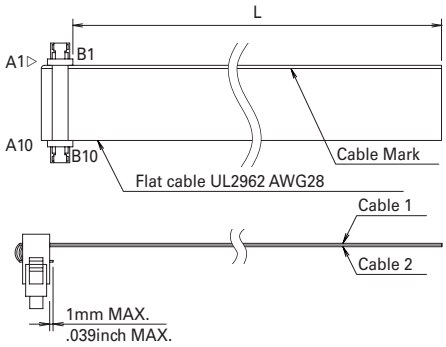
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	CHANNEL A
2(B1)	Brown	CHANNEL $\overline{A}$
3(A2)	Green	CHANNEL B
4(B2)	Purple	CHANNEL $\overline{B}$
5(A3)	White	CHANNEL C
6(B3)	Yellow	CHANNEL $\overline{C}$
7(A4)	Red	+5V
8(B4)	Black	0V
9(A5)	N.C.	—
10(B5)	Orange	OVER HEAT
11(A6)	Black	Shield
12(B6)	N.C.	—

Connector Set : PBC6E0000A

Manufacturer	Type	Qty
AMP	Housing : 1-1318115-6	1
	Terminal : 1318110-1	10
	Housing : 1-1318118-6	1
	Terminal : 1-1318106-1	10

④ I/O Cable (unshielded)



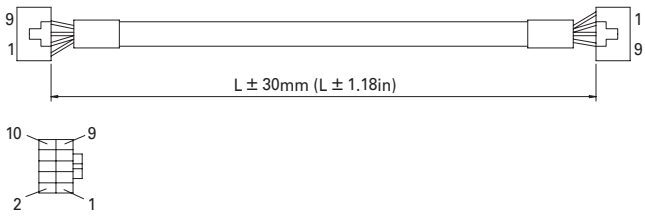
Cable Connection

Cable 1	Cable 2
A1-No.1	B1-No.11
A2-No.2	B2-No.12
A3-No.3	B3-No.13
A4-No.4	B4-No.14
A5-No.5	B5-No.15
A6-No.6	B6-No.16
A7-No.7	B7-No.17
A8-No.8	B8-No.18
A9-No.9	B9-No.19
A10-No.10	B10-No.20

Connector Set : PBC1S0000A

Manufacturer	Type	Qty
KEL	CONNECTOR : 8822E-020-171D	1

⑤ Communication Cable



Connector relay cable

Signal Name	CNA Pin.No.		CNB Pin.No.	Signal Name
A	1	Yellow	1	A
B	2	White	2	B
(Y)	3	Brown	3	(Y)
(Z)	4	Blue	4	(Z)
GND	5	Black	5	GND
Vcc	6	Red	6	Vcc
—	7	Purple	7	—
—	8	Green	8	—
—	9		9	—
FG	10	Drain	10	FG

Connector Set : PBC6C0000A

Manufacturer	Type	Qty
JST	Housing : PADP-10V-1-S	2
	Contact : SPH-OO2T-P0.5L	20

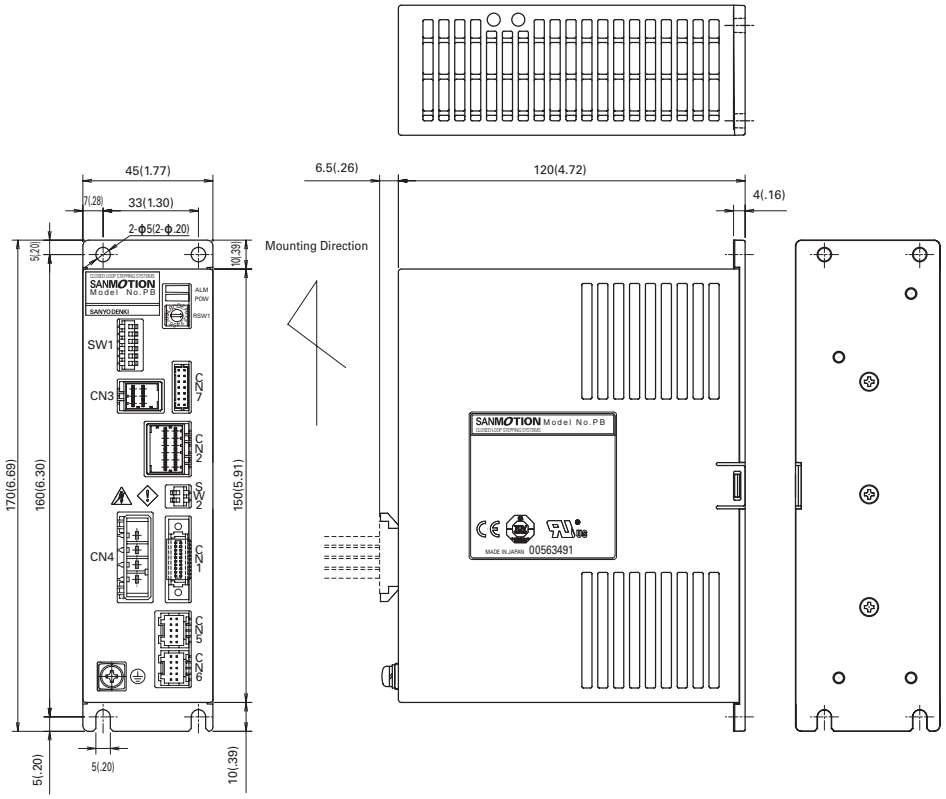
Model No. PB Type R　Single-Axis Type

AC Power Input Type

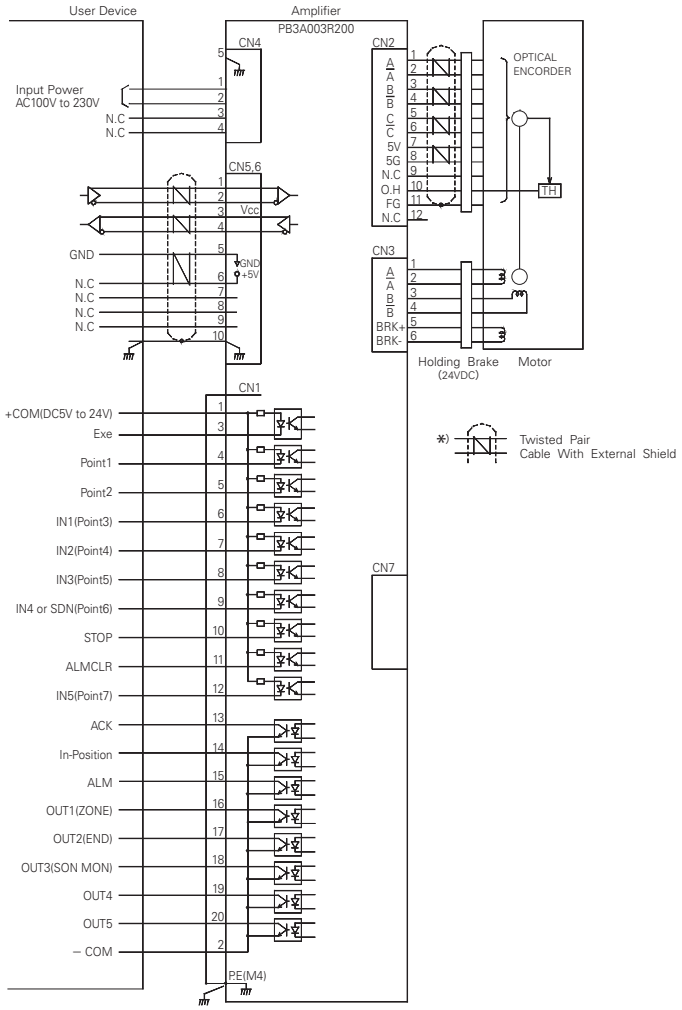
General Specifications

Amplifier Model			PB3A003R200
Control Mode			PWM Control　SIN drive method
Power Supply	Single Power		AC100V to 230V −15% +10%　　50 / 60Hz
Environment	Ambient temp.	Operating	0 to 55℃
		Storage	−20 to 70℃
	Operating/ Storage Humidity		Maximum 90% RH（non-condensing）
	Vibration Resistance		0.5G（tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H）
Structure			Tray structure　Rear mounting type
Mass (Weight) / Dimensions			Approx. 0.8kg（28.22oz）/ W45×H150×D120mm（W1.77×H5.91×D4.72inch）
Functions	Rotation Speed		0 to 4500min^{-1}（4000min^{-1} is used for an 86mm-square motor）
	Resolution (P/R)		500, 1000, 2000, 4000, 5000, 10000
	Regeneration Process		Internal（external regeneration available）
	Protective Functions		Encoder Disconnection, Encoder Counter Error, Power Voltage Error, Initialization Error, Position Deviation Error, Over-speed, Regeneration Voltage Error, Zero-return Error, Absolute position sign reversal, Deviation Counter Overflow, Motor Overheat, Amplifier Overheat, Internal voltage Error, Over-current, CPU Error
	LED Display		Power status, Alarm（flashing indicator）
	Operation Functions		Normal Drive（incremental move command, absolute move command), Zero-return, Module Operation,　Push Operation
	Switch		DIP SW1: Transmission Speed Setting（9600, 38400,115200,128000bps）　DIP SW2:　Terminating Resistor Setting RSW：Node Adress Setting（0 to F）
Input/ Output Signals	Input Signals		Fixed function（2）：　EXE, Point, ALMCLR, STOP Selectable（5）：　Point, Pause, Interlock, SELECT, Generic Input, HOME, Hard Limit
	Output Signals		CN1 Fixed function（2）：　ALM, In-Position, Ack Selectable（5）：　ZONE, END, Busy, HEND, SON MON, Generic Input, Input Monitor
	Communication Specifications		RS-485 Standard　　Start-Stop Synchronization, Full　Duplex Trans. Speed: 9600, 38400, 115200, 128000bps

Amplifier Dimensional Drawing［Unit : mm（inch）］



External Wiring Diagram

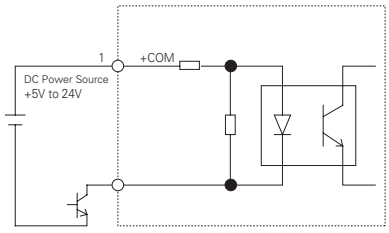


Note 1: The CN1 general-purpose input / output signal function is selected through communication.
Please see the basic specifications for details.

Input / Output Signals Circuit

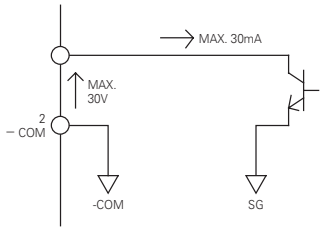
■ Generic Input

Input Voltage Specifications : DC5V to 24V±10%



■ Generic Output

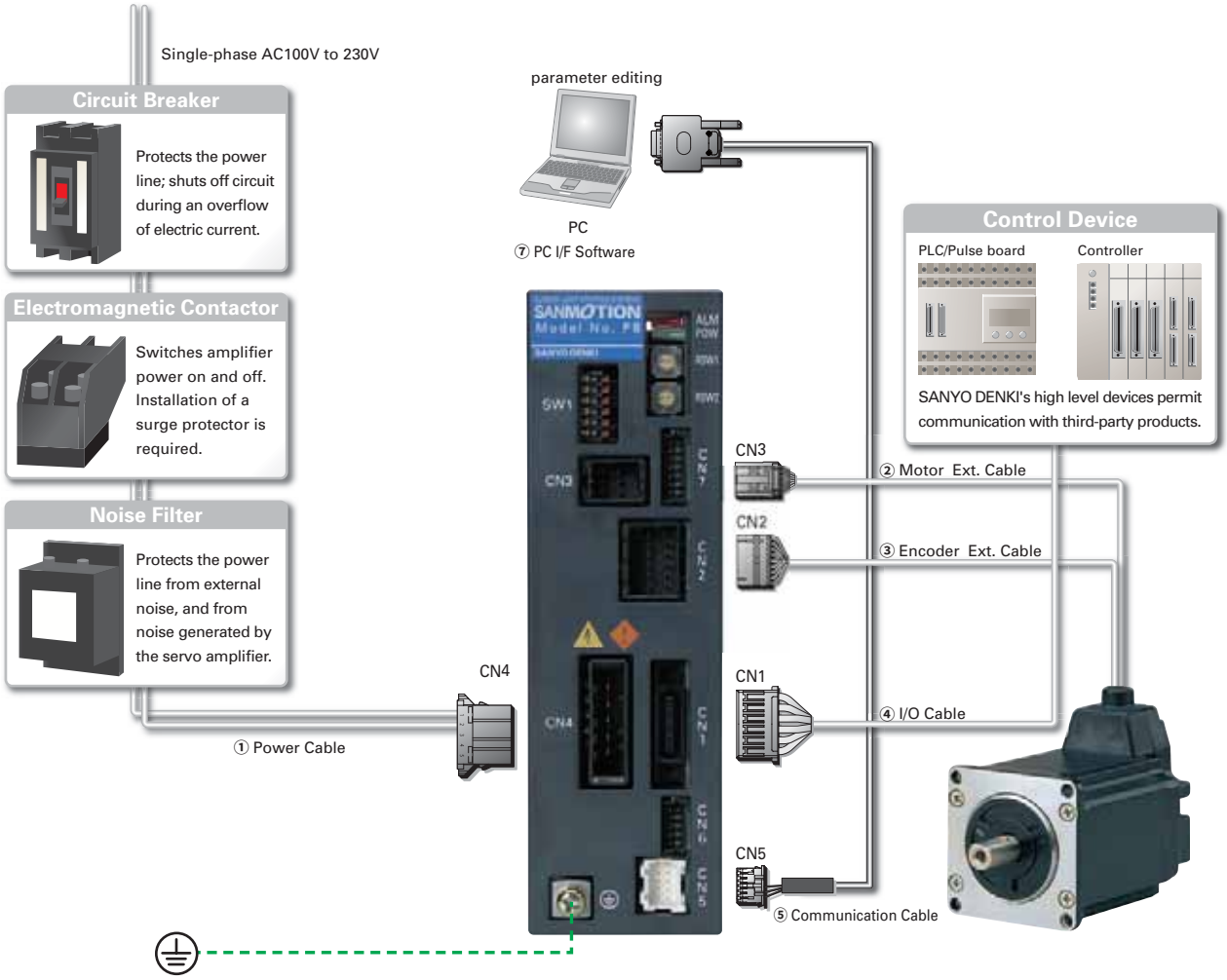
Output Current : 30mA MAX.



Model No. PB Type P

AC Power Input Type

System Configuration

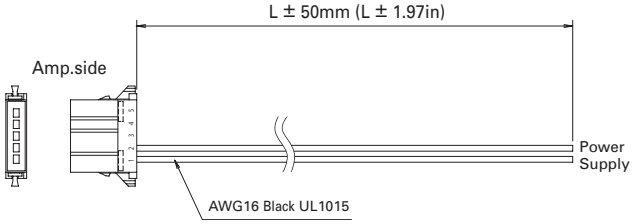


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC7P0010A 1m (39.37in)	PBC7P0000A	2m (78.74 in)	–
② Motor Ext. Cable	PBC6M0030A 3m (118.11in)	PBC6M0000A	20m (787.40 in)	Use when an extension of 50cm(19.69in) or more is required.
③ Encoder Ext. Cable	PBC6E0030A 3m (118.11in)	PBC6E0000A	20m (787.40 in)	Use when an extension of 50cm(19.69in) or more is required.
④ I/O Cable (shielded)	PBC1S0010C 1m (39.37in)	PBC1S0000A	2m (78.74 in)	–
⑤ Communication Cable (Dsub9pin)	PBC5C0010A 1m (39.37in)	–	–	Dedicated cable for RS-232C communications
⑥ Communication Converter Unit	Not required	–	–	–
⑦ PC I/F Software	SPBA1W-01	–	–	Software for operational check and parameter setting

Optional Cable

① Power Cable

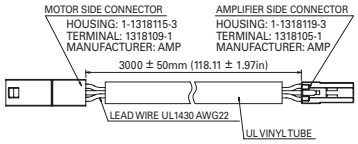


PIN No.	LEAD COLR	
1	Black	AC1
2	Black	AC2
3	—	—
4	—	—
5	—	—

Connector Set : PBC7P0000A

Manufacturer	Type	Qty.
AMP	Housing : 1-178288-5	1
	Contact : 1-175218-5	5

② Motor Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

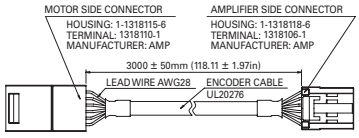
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

Connector Set : PBC6M0000A

Manufacturer	Type	Qty.
AMP	Housing : 1-1318115-3	1
	Terminal : 1318109-1	6
	Housing : 1-1318119-3	1
	Terminal : 1318105-1	6

③ Encoder Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	—
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	—

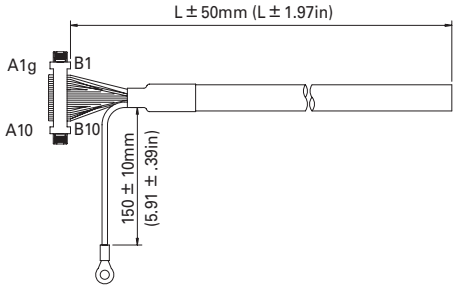
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	CHANNEL A
2(B1)	Brown	CHANNEL $\overline{A}$
3(A2)	Green	CHANNEL B
4(B2)	Purple	CHANNEL $\overline{B}$
5(A3)	White	CHANNEL C
6(B3)	Yellow	CHANNEL $\overline{C}$
7(A4)	Red	+5V
8(B4)	Black	0V
9(A5)	N.C.	—
10(B5)	Orange	OVER HEAT
11(A6)	Black	Shield
12(B6)	N.C.	—

Connector Set : PBC6E0000A

Manufacturer	Type	Qty.
AMP	Housing : 1-1318115-6	1
	Terminal : 1318110-1	10
	Housing : 1-1318118-6	1
	Terminal : 1-1318106-1	10

④ I/O Cable (shielded)



CN1 Wiring

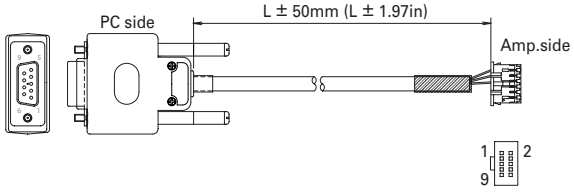
CN1 PIN No.	Mark Display	Mark	LINE COLR
A1	|	Red	Orange
A2		Black	
A3		Red	Gray
A4		Black	
A5		Red	White
A6		Black	
A7		Red	Yellow
A8		Black	
A9		Red	Pink
A10		Black	

CN1 PIN No.	Mark Display	Mark	LINE COLR
B1	|	Red	Orange
B2		Black	
B3		Red	Gray
B4		Black	
B5		Red	White
B6		Black	
B7		Red	Yellow
B8		Black	
B9		Red	Pink
B10		Black	

Connector Set : PBC1S0000A

Manufacturer	Type	Qty.
KEL	Connector : 8822E-020-171D	1
	Crimp Contact : V1.25-M4	—
	Drain Wire : UL1007 20AWG	—
	Cable : UL20276-28AWG	—

⑤ Communication Cable (Dsub 9Pin)



Connector relay cable

PC Side Pin.No.	Signal Name
1	N.C
2	RXD
3	TXD
4	N.C
5	GND
6	N.C
7	N.C
8	N.C
9	N.C

(RS-232C D-Sub 9Pin)

Amp.Side Pin.No	Signal Name
1	RXD
2	TXD
3	N.C
4	N.C
5	GND
6	N.C
7	N.C
8	N.C
9	N.C
10	Shield

*Without connector set

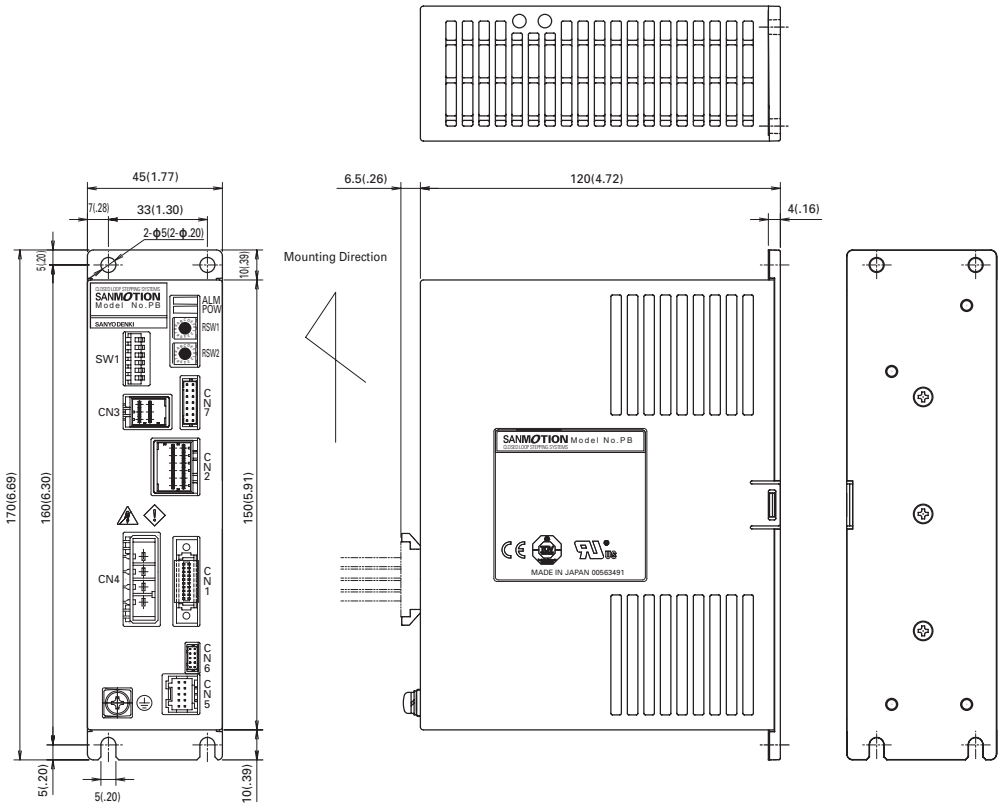
Model No. PB Type P

AC Power Input Type

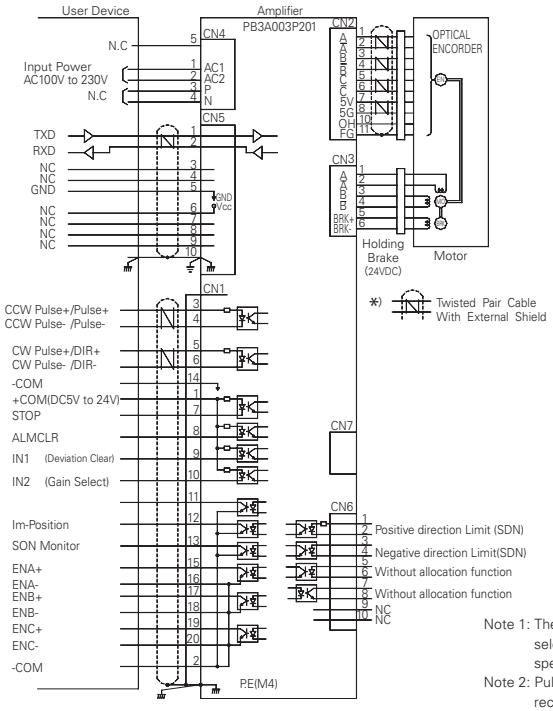
General Specifications

Amplifier Model			PB3A003P201, PB3A003P202
Control Mode			PWM Control　SIN drive method
Power Supply	Single Power		AC100V to 230V −15% +10%　　50 / 60Hz
Environment	Ambient temp.	Operating	0 to 55℃
		Storage	−20 to 70℃
	Operating/ Storage Humidity		Maximum 90% RH（non-condensing）
	Vibration Resistance		0.5G（tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H）
Structure			Tray structure　Rear mounting type
Mass (Weight) / Dimensions			Approx. 0.8kg（28.22oz）/ W45×H150×D120mm（W1.77×H5.91×D4.72inch）
Functions	Rotation Speed		0 to 4500min^{-1}（4000min^{-1} is used for an 86mm-square motor）
	Resolution (P/R)		500, 1000, 2000, 4000, 5000, 10000
	Regeneration Process		Internal（external regeneration available）
	Protective Functions		Encoder Disconnection, Encoder Counter Error, Power Voltage Error, Initialization Error, Position Deviation Error, Over-speed,Regeneration Voltage Error, Zero-return Error, Absolute position sign reversal, Deviation Counter Overflow, Motor Overheat, Amplifier Overheat, Internal voltage Error, Over-current, CPU Error
	LED Display		Power status, Alarm（flashing indicator）
	Functions		Normal Drive, Zero-return, S-shape Acceleration / Deceleration Drive
	Switch		DIP SW1: Pulse Input Type Select（ON: 2 Input　OFF: 1 Input） DIP SW2, 3: Resolution Selection（500, 1000, 5000, 10000P/R） ※ 2000 and 4000 division resolution modes are selected via communication DIP SW 4 to 6: Motor Select RSW1: Normalize velocity loop gain setting RSW2: S-Shape filter potentiometer setting
Input/ Output Signals	Input Signals		Pulse, Deviation Clear, HOME, Hard.Limit, STOP, ALMCLR
	Output Signals		SON Monitor, ALM, Zero-return completion,In-Position, Encoder Signal Output
	Communication Specifications		RS-232C（For parameter setting） Trans. Speed：9600bps

Amplifier Dimensional Drawing［Unit : mm（inch）］



External Wiring Diagram



Note 1: The CN1 general-purpose input/output signal function is selected through communication. Please see the basic specifications for details.

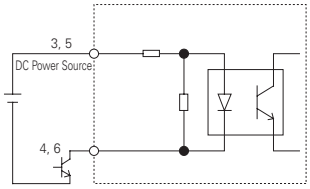
Note 2: Pulse input and encoder output signal circuitry are line receiver type.Linedriver type is also available as amplifier model PB3A003P202.

Input / Output Signals Circuit

PB3A003P201

■ Pulse Input

Input Voltage Specifications : DC5V±10%

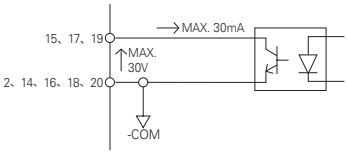


In case the voltage is at 5V MIN.
Insert a resistor "R" which satisfies "
(Input Voltage−1V) ／ (270＋R) 10 mA

Line driver input permitted

■ Encoder Signal Output

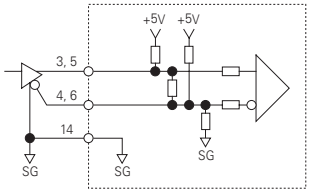
Collector Voltage: DC30V MAX.
Output Current : 30mA MAX.



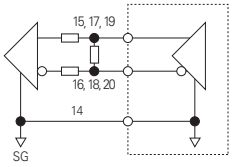
PB3A003P202

■ Pulse Input

Pulse Input : 250kpps MAX.



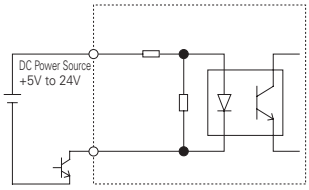
■ Encoder Signal Output



PB3A003P201/202

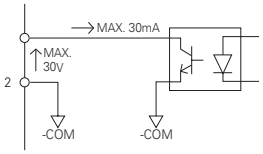
■ Generic Input ／ Limit Input

Input Voltage Specifications : DC5V to 24V±10%



■ Generic Output

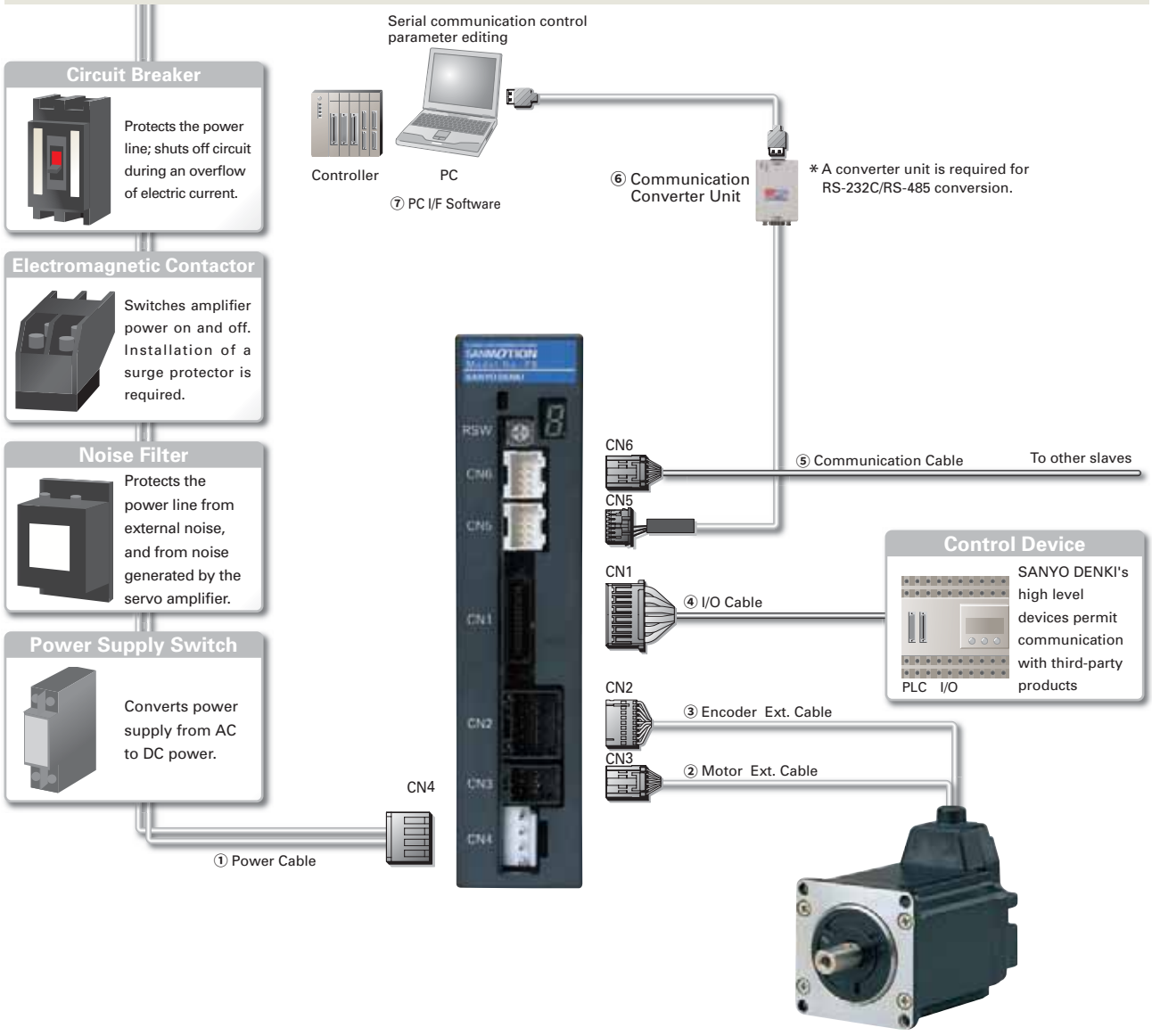
Collector Voltage: DC30V MAX.
Output Current : 30mA MAX.



Model No. PB Type M

DC Power Input Type

System Configuration

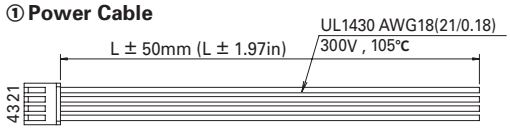


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC6P0010A 1m (39.37in)	PBC6P0000A	2m (78.74 in)	–
② Motor Ext. Cable	PBC6M0030A 3m (118.11in)	PBC6M0000A	20m (787.40 in)	Use when an extension of 50cm(19.69in) or more is required.
③ Encoder Ext. Cable	PBC6E0030A 3m (118.11in)	PBC6E0000A	20m (787.40 in)	Use when an extension of 50cm(19.69in) or more is required.
④ I/O Cable (unshielded)	PBC5S0010A 1m (39.37in)	PBC5S0000A	2m (78.74 in)	–
④ I/O Cable (shielded)	PBC5S0010C 1m (39.37in)	PBC5S0000A	2m (78.74 in)	Use for pulse input
⑤ Communication Cable (to Amp.)	PBC6C0003A 30cm (11.81in)	PBC6C0000A	100m (3937.01 in)	Use when multiple axes are connected in a daisy-chain configuration for communication.
⑥ Communication Converter Unit	PBFM-U5	Main Body Model.No：232485CFP01-01 Cable Model.No：PBC4T0005A		RS-232C ／ RS-485 Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBAIW01	–	–	Software for operational check and parameter setting

Optional Cable

① Power Cable



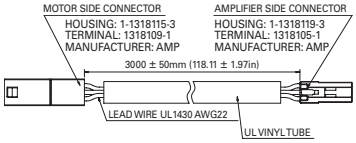
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1	Red	DC+24/48V
2	Blue	GND
3	Yellow	—
4	Green	FG

Connector Set : PBC6P0000A

Manufacturer	Type	Qty.
JST	Connector : VHR-4N	1
	Contact : SVH-21T-P1.1	4
	Appropriate electric wire : AWG#22-18	—

② Motor Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

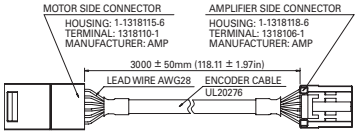
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

Connector Set : PBC6M0000A

Manufacturer	Type	Qty.
AMP	Housing : 1-1318115-3	1
	Terminal : 1318109-1	6
	Housing : 1-1318119-3	1
	Terminal : 1318105-1	6

③ Encoder Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	—
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	—

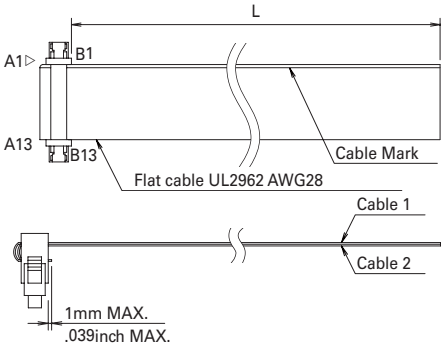
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	CHANNEL A
2(B1)	Brown	CHANNEL $\overline{A}$
3(A2)	Green	CHANNEL B
4(B2)	Purple	CHANNEL $\overline{B}$
5(A3)	White	CHANNEL C
6(B3)	Yellow	CHANNEL $\overline{C}$
7(A4)	Red	+5V
8(B4)	Black	0V
9(A5)	N.C.	—
10(B5)	Orange	OVER HEAT
11(A6)	Black	Shield
12(B6)	N.C.	—

Connector Set : PBC6E0000A

Manufacturer	Type	Qty.
AMP	Housing : 1-1318115-6	1
	Terminal : 1318110-1	10
	Housing : 1-1318118-6	1
	Terminal : 1318106-1	10

④ I/O Cable (unshielded)



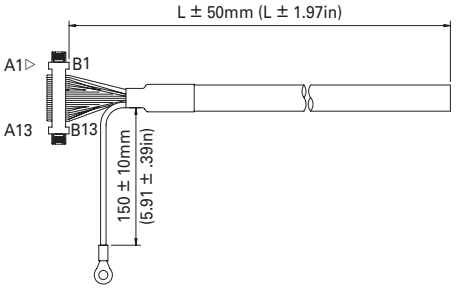
Cable Connection

Cable 1	Cable 2
A1-No.1	B1-No.14
A2-No.2	B2-No.15
A3-No.3	B3-No.16
A4-No.4	B4-No.17
A5-No.5	B5-No.18
A6-No.6	B6-No.19
A7-No.7	B7-No.20
A8-No.8	B8-No.21
A9-No.9	B9-No.22
A10-No.10	B10-No.23
A11-No.11	B11-No.24
A12-No.12	B12-No.25
A13-No.13	B13-No.26

Connector Set : PBC5S0000A

Manufacturer	Type	Qty.
KEL	Connector : 8822E-026-171D	1

④ I/O Cable (shielded)



CN Wiring

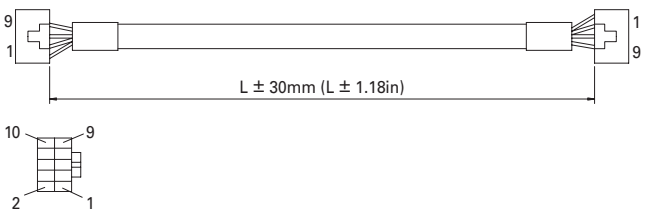
CN1 Pin.No.	Signal Name	Mark	LINE COLR
A1		Red	Orange
A2		Black	
A3		Red	Gray
A4		Black	
A5	|	Red	White
A6		Black	
A7		Red	Yellow
A8		Black	
A9		Red	Pink
A10		Black	
A11	|	Red	Orange
A12	|	Black	
A13		Red	Gray

CN1 Pin.No.	Signal Name	Mark	LINE COLR
B1		Black	Gray
B2		Red	White
B3		Black	
B4	|	Red	Yellow
B5	|	Black	
B6		Red	Pink
B7		Black	
B8		Red	Orange
B9	|	Black	
B10	|	Red	Gray
B11	|	Black	
B12		Red	White
B13		Black	

Connector Set : PBC5S0000A

Manufacturer	Type	Qty.
KEL	Connector : 8822E-026-171D	1
	Crimp Contact : V1.25-M4	—
	Drain Wire : UL1007 20AWG	—
	Cable : UL20276-28AWG	—

⑤ Communication Cable (Dsub 9 Pin)



Connector relay cable

Signal Name	CNA Pin.No.		CNB Pin.No.	Signal Name
A	1	Yellow	1	A
B	2	White	2	B
(Y)	3	Brown	3	(Y)
(Z)	4	Blue	4	(Z)
GND	5	Black	5	GND
Vcc	6	Red	6	Vcc
—	7	Purple	7	—
—	8	Green	8	—
—	9		9	—
FG	10	Drain	10	FG

Connector Set : PBC6C0000A

Manufacturer	Type	Qty.
JST	Housing : PADP-10V-1-S	2
	Contact : SPH-OO2T-P0.5L	20

Model No. PB Type M

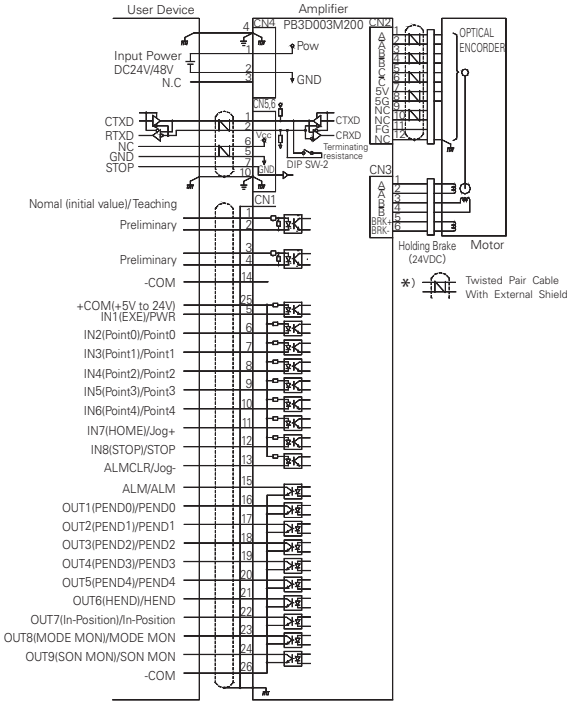
DC Power Input Type

General Specifications

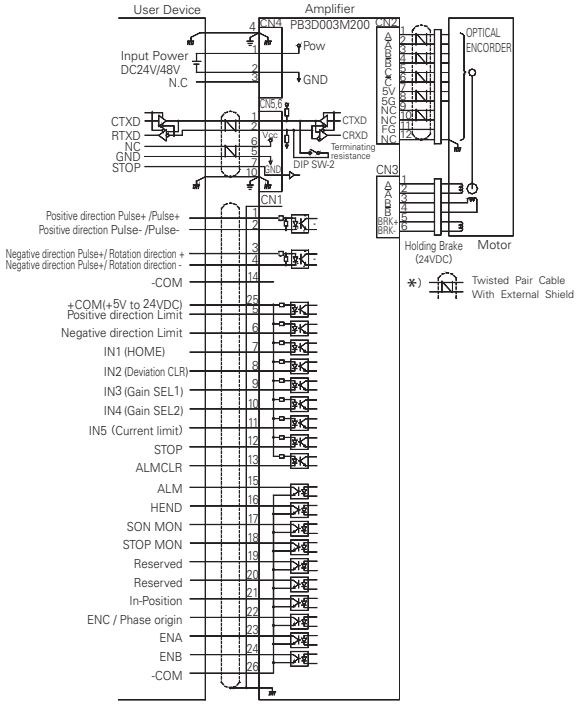
Amplifier Model			PB3D003M200	
Interface			Generic Input (SW1=ON)	Pulse Train Input (SW1 = OFF)
Control Mode			PWM Control SIN drive method	
Power Supply	Single Power		DC24V / 48V ±10% (□28mm [□1.10inch] Motor is only available as 24V.)	
Environment	Ambient temp.	Operating	0 to 55℃	
		Storage	–20 to 70℃	
	Operating/ Storage Humidity		Maximum 90% RH (non-condensing)	
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H)	
Mass (Weight) / Dimensions			Approx. 0.36kg (12.70oz) / W32×H160×D95mm (W1.26×H6.30×D3.74inch)	
Functions	Rotation Speed		0 to 4500min^{-1}	
	Resolution (P/R)		500, 1000, 2000, 4000, 5000, 10000	
	Regeneration Process		Built-in	
	Protective Functions		Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, CPU Error, Overload Stop, Excessive Position Deviation, Zero-return Error, Nonvolatile Memory Error, Initialization Error (Power Line Disconnection)	
	Display		7SEG LED Display	
	Functions		Normal Drive (incremental move , absolute move) , Zero-return, Module Operation, Push Operation, Teaching Functions Point Functions: 128Point Program Functions: 1PRG×1024Line 32PRG×32Line 128PRG×8Line	Normal Drive, Zero-return
	Rotary Switch		Node Adress Setting (0 to F)	Normalize velocity loop gain setting
	DIP-Switches		SW1：Interface Selection (On: RS-485, OFF: Pulse) SW2：Terminating Resistor Setting (On: with terminating resistance)	
Input/ Output Signals	Input Signals		(Normal Mode) STOP, EXE, POINT, HOME, JOG, SELECT, Pause, Interlock, Generic Input, MODE SELECT, Hard Limit, ALM CLR (Teaching Mode) STOP, JOG, Point, PWR	Pulse, STOP, ALMCLR, Gain Setting, Deviation Clear, HOME
	Output Signals		(Normal Mode) Ack, PEND, END, Busy, Zone, Mode MON, STOP MON, In-Position, Homing complete, Generic Output, Encoder Output, Input Monitor (Teaching Mode) PEND, HEND, In-Position, Mode MON, SON MON	ALM, STOP MON, In-Position, Homing complete, Encoder Output, SON MON, STOP MON
	Communication Specifications		RS-485 Standard Start-Stop Synchronization, Full Duplex	
	Trans. Speed		9600, 38400, 115200, 128000bps	9600bps

External Wiring Diagram

■ Generic Input DIP Switch SW1:ON

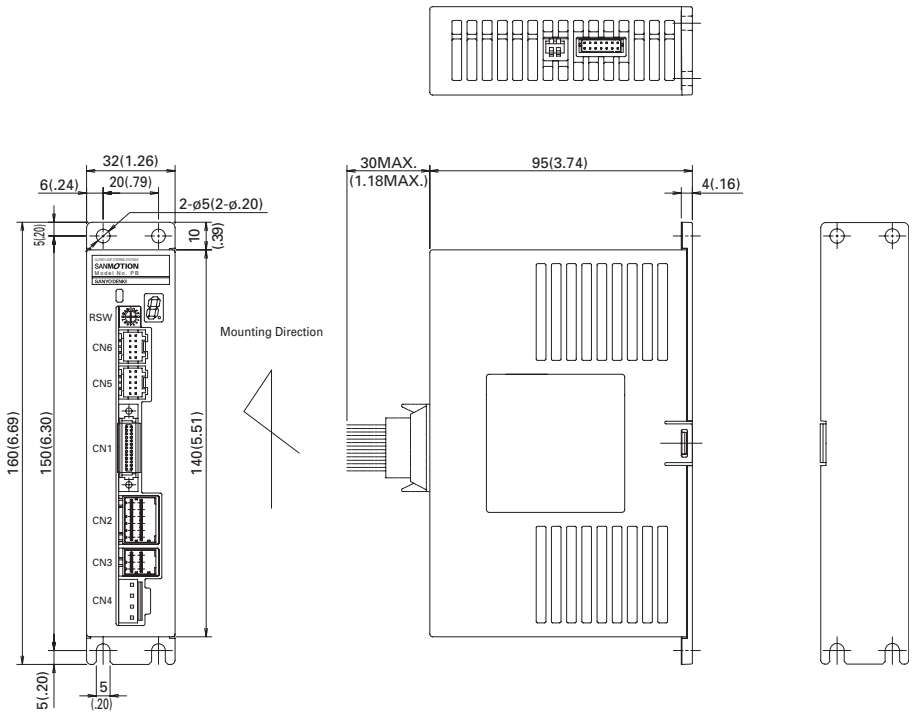


■ Pulse Stream Input DIP Switch SW1:OFF



Note 1: The CN1 general-purpose input / output signal function is selected through communication. Please see the basic specifications for details.

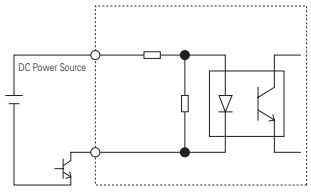
Amplifier Dimensional Drawing［Unit : mm (inch)］



Input/ Output Signals Circuit

■ CN1- Pin. No.1,2 / No.3,4

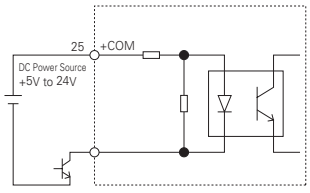
Input Voltage Specifications : DC3V to 5V±10%
Pulse Input : 250kpps MAX.



In case the voltage is at 5V MIN.
Insert a resistor "R" which satisfies " (Input Voltage−1V) / (270 + R) 10 mA

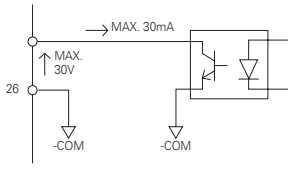
■ Generic Input (CN1- Pin.5 to No.13)

Input Voltage Specifications : DC5V to 24V±10%



■ Generic Output

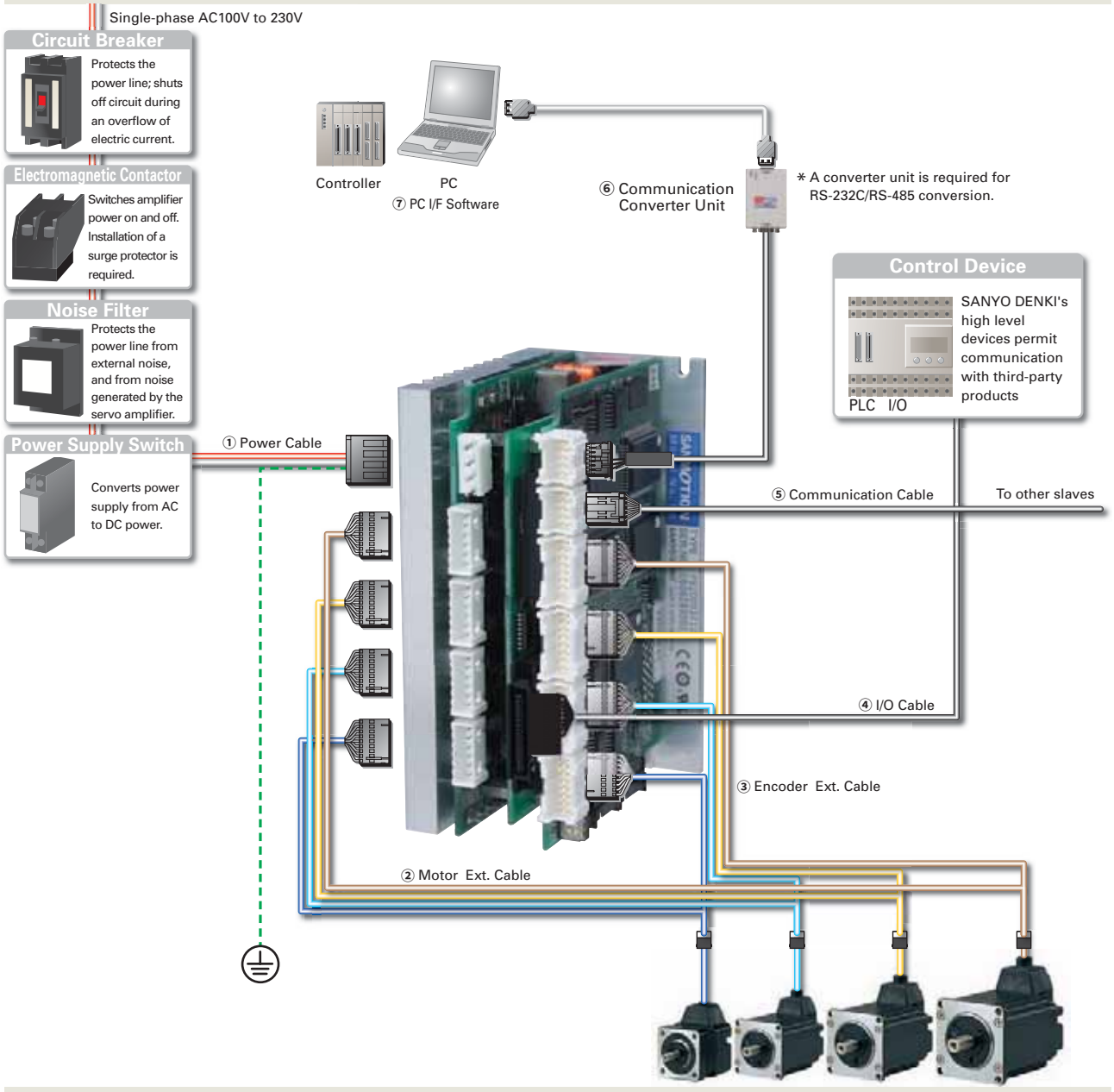
Collector Voltage : DC30V MAX.
Output Current : 30mA MAX.



Model No. PB Type R　Multi-Axis Type

DC Power Input Type

System Configuration

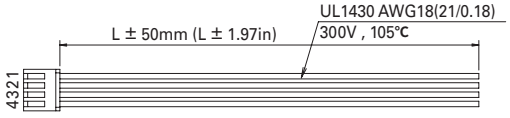


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC6P0010A 1m (39.37in)	PBC6P0000A	2m (78.74 in)	–
② Motor Cable	PBC4M0030A 3m (118.11in)	PBC4M0000A	20m (787.40 in)	An extension cable is required.
③ Encoder Cable	PBC5E0030A 3m (118.11in)	PBC5E0000A	20m (787.40 in)	An extension cable is required.
③ Encoder Cable (with limit sensor input)	PBC5E0030C 3m (118.11in)	PBC5E0000A	20m (787.40 in)	Please specify when using an external limit sensor.
④ I/O Cable	PBC4S0010A 1m (39.37in)	PBC4S0000A	2m (78.74 in)	–
⑤ Communication Cable	PBC4C0003A 30cm (11.81in)	PBC4C0000A	100m (3937.01 in)	Use when multiple axes are connected in a daisy-chain configuration for communication.
⑥ Communication Converter Unit	PBFM-U5	Main Body Model.No：232485CFP01-01 Cable Model.No：PBC4T0005A		RS-232C ／ RS-485 Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBR1W-01	–	–	Software for operational check and parameter setting
⑧ Regenerative Unit	PBFE-01	–	–	Required if regeneration voltage is more than 40V

Optional Cable

① Power Cable



Connector Connection Of Amplifier Side

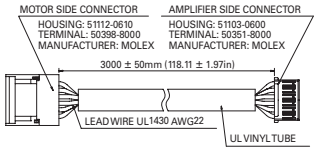
PIN No.	LEAD COLR	Signal Name
1	Red	DC+24/48V
2	Blue	GND
3	Yellow	DC+24V *1
4	Green	FG

*Connect only for amplifiers with part numbers ending with "1" or "2"

Connector Set : PBC6P0000A

Manufacturer	Type	Qty.
JST	Connector : VHR-4N	1
	Contact : SVH-21T-P1.1	4
	Appropriate electric wire : AWG#22-18	—

② Motor Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

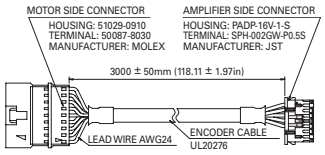
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

Connector Set :PBC4M0000A

Manufacturer	Type	Qty.
MOLEX	Housing : 51112-0610	1
	Terminal : 50398-8000	6
	Housing : 51103-0600	1
	Terminal : 50351-8000	6

③ Encoder Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield

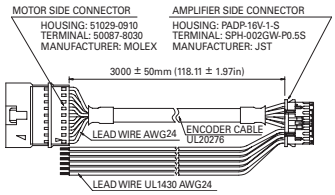
Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield
10	N.C.	—
11	N.C.	—
12	N.C.	—
13	N.C.	—
14	N.C.	—
15	N.C.	—
16	N.C.	—

Connector Set :PBC5E0000A

Manufacturer	Type	Qty.
MOLEX	Housing : 51029-0910	1
	Terminal : 50087-8030	9
JST	Housing : PADP-16V-1-S	1
	Terminal : SPH-002GW-P0.5S	15

③ Encoder Cable (with limit sensor input)



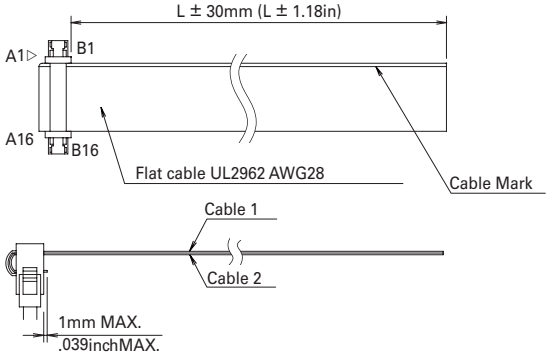
Connector Connection Of Motor Side

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield

Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield
10	N.C.	—
11	Blue	SDN
12	Black	GND
13	Yellow	LIMIT
14	Black	GND
15	Red	Vcc
16	Red	Vcc

④ I/O Cable (unshielded)



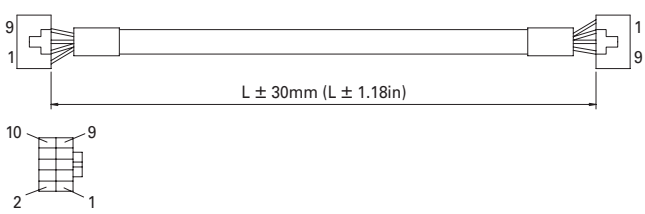
Cable Connection

Cable 1	Cable 2
A1-No.1	B1-No.17
A2-No.2	B2-No.18
A3-No.3	B3-No.19
A4-No.4	B4-No.20
A5-No.5	B5-No.21
·	·
·	·
·	·
·	·
A13-No.13	B13-No.29
A14-No.14	B14-No.30
A15-No.15	B15-No.31
A16-No.16	B16-No.32

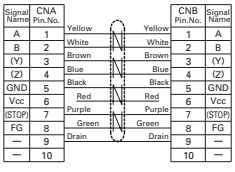
Connector Set :PBC4S0000A

Manufacturer	Type	Qty.
KEL	Connector : 8822E-032-171D	1

⑤ Communication Cable



Connector relay cable



Connector Set :PBC4C0000A

Manufacturer	Type	Qty.
JST	Housing : PADP-10V-1-S	2
	Contact : SPH-OO2T-P0.5L	20

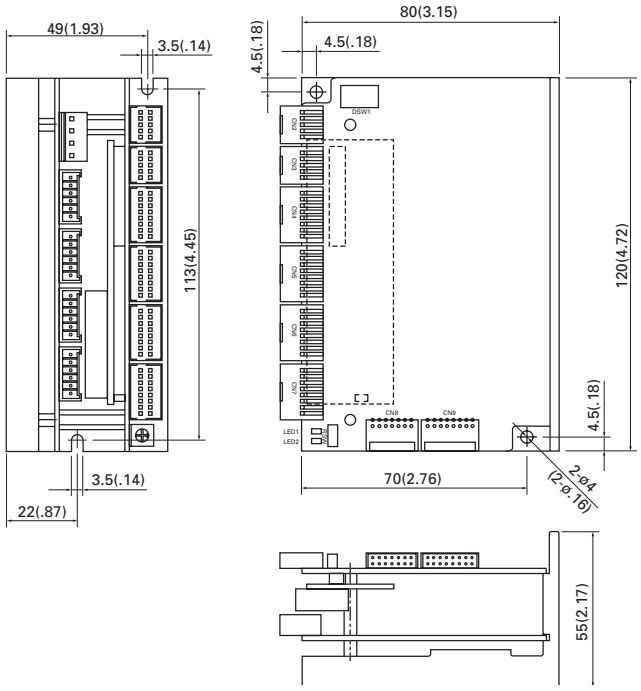
Model No. PB Type R　Multi-Axis Type

DC Power Input Type

General Specifications

Amplifier Model			PB2D003R1U△
Control Mode			PWM Control　Trapezoidal drive method
Power Supply	Main Power Supply Control Power Supply		DC24V/36V±10% DC24V±10%　(only for part numbers ending with "1" or "3")
Environment	Ambient temp.	Operating	0 to 55℃
		Storage	–20 to 70℃
	Operating/ Storage Humidity		Maximum 90% RH (non-condensing)
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H)
Structure			Open Frame
Mass (Weight) / Dimensions			Approx. 0.8kg (28.22oz) / W120×H55×D80 (W1.77×H5.91×D4.72inch)
Functions	Rotation Speed		0 to 4500min^{-1}
	Resolution (P/R)		200, 800, 1600, 3200, 6400, 12800
	Regeneration Process		Not available (External regenerative unit is optional)
	Protective Functions		Over-voltage, Regenerated voltage overload, Over-speed, Encoder disconnection, Reset error, CPU error, Overload stop, Soft Servo Error, Amplifier Overheat
	Display		Power status, Alarm (flashing indicator)
	Functions		Operation Functions：Normal Drive(incremental move , absolute move), Zero-return, push operation Point Function：256Point Program Function：256PRG×16Line 8PRG×512LINE
	Switch		DIP SW1,2：Transmission Speed Setting DIP SW3 to 6：Axis valid / invalid (On: Activate) DIP SW7 to 10：Terminating Resistor Setting (On: with terminating resistance) Rotary SW：Node Adress Setting (0 to E)
Input/ Output Signals	Input Signals		CN1 Fixed function (4) : EXE, Point, SELECT, STOP, ALMCLR CN1 Selectable (4) : Generic Input, Point, Pause, Interlock CN4 to CN7 Allocation Function (2 X 4-axis) Hard.Limit (SDN) Signal
	Output Signals		CN1 Fixed function In-Position, Ack, Busy, ALM CN1Selectable (8) Generic Output, Motor Stop, H.Limit Monitor, ZONE, Zero-return completion, END, STOP Monitor, SDN Monitor
	Communication Specifications		RS-485 Standard　Start-Stop Synchronization, Half Duplex (Part numbers ending with "0" or "1") RS-485 Standard　Start-Stop Synchronization, Full Duplex (Part numbers ending with "2" or "3")

Amplifier Dimensional Drawing [Unit : mm (inch)]

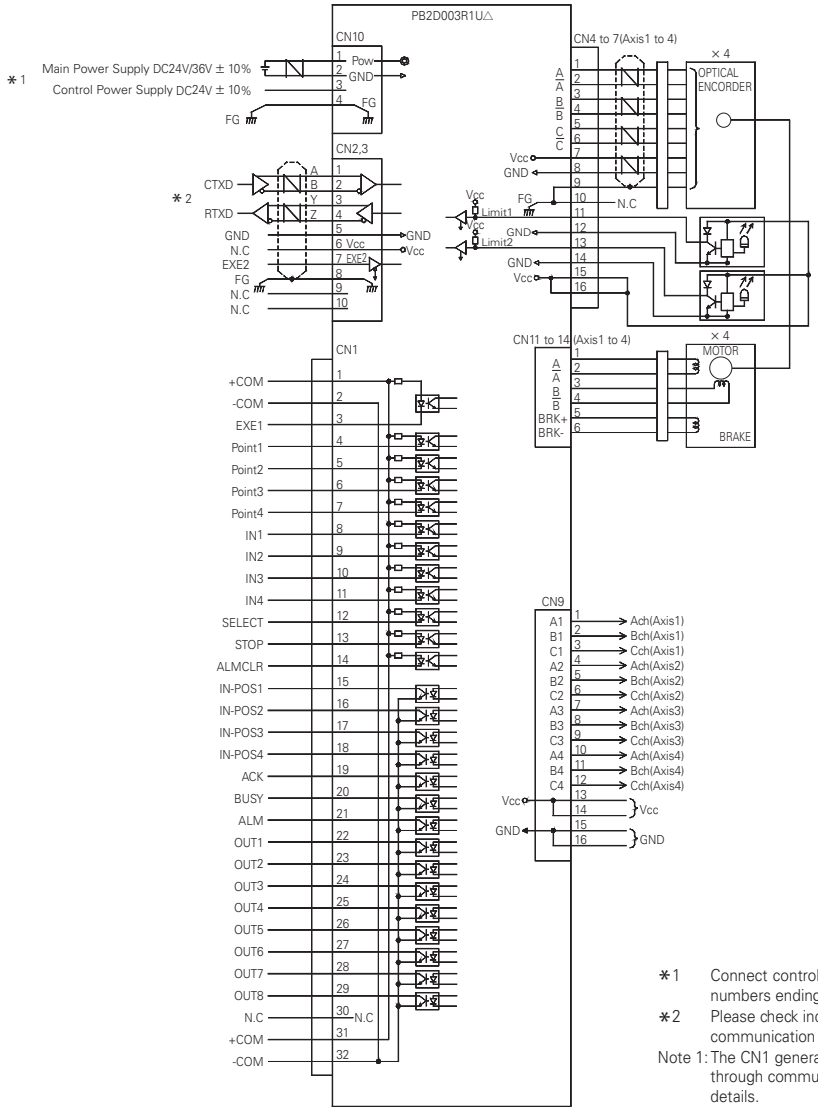


Amplifier Model Number Nomenclature

PB2D003R1U△

△	Communication Specifications	Power Input
0	Start-Stop Synchronization, Half Duplex	Single Pwr.
1		Separate
2	Start-Stop Synchronization, Full Duplex	Single Pwr.
3		Separate

External Wiring Diagram



＊1 Connect control circuit to power source only for models with part numbers ending with "1" or "3".

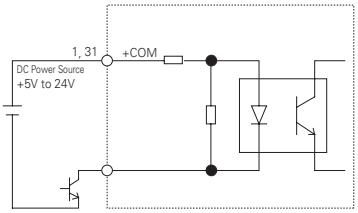
＊2 Please check individual specifications for each part number, as communication specifications differ according to amplifier model.

Note 1: The CN1 general-purpose input/output signal function is selected through communication. Please see the basic specifications for details.

Input/ Output Signals Circuit

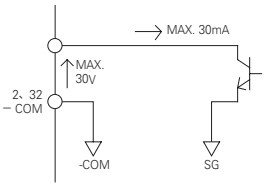
■ Generic Input

Input Voltage Specifications：DC5V to 24V±10%



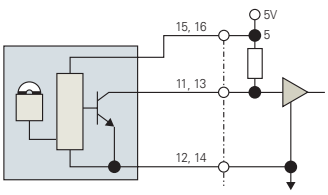
■ Generic Output

Generic Output 30 mA MAX.



■ Hard Limit (SDN) ＊CN4 to 7

Not insulated



General Specifications

Standard Model

Motor Flange Size

AC □42 (1.65in) □60 (2.36in) □86 (3.39in)

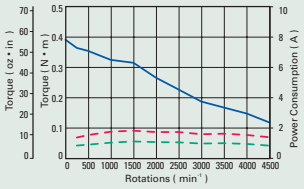
DC □28 (1.10in) □42 (1.65in) □60 (2.36in)

Size	Motor Flange Size	□ 28mm (□ 1.10in)		□ 42mm (□ 1.65in)
	Motor Length	58.5mm (2.30in)	77.8mm (3.06in)	57.6mm (2.27in)
Motor Model (A C)	Unit	—	—	PBM423FXE20
Type R Set Model No.		—	—	PBAR423
Related Amplifier Model No		—	—	PB3A003R200
Type P Set Model No.		—	—	PBAP423
Related Amplifier Model No		—	—	PB3A003P200
Motor Model (D C)		PBM282FXE20	PBM284FXE20	PBM423FXE20
Type M Set Model No.		PBDM282	PBDM284	PBDM423
Related Amplifier Model No		PB3D003M200		
Motor Model (D C)		PBM282DXA20	PBM284DXA20	PBM423DXA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N • m (oz • in)	0.055(7.79)	0.115(16.28)	0.39(55.23)
Rotor Inertia	$\times 10^{-4}$kg•m^2 (oz • in^2)	0.008(0.044)	0.016(0.087)	0.056(0.306)
Allowable Thrust Load	N	9.8	9.8	9.8
Allowable Radial Load Note 1)	N	33	33	49
Motor Mass (Weight)	kg (oz)	0.16(5.64)	0.23(8.11)	0.35(12.35)

Motor Characteristics Chart AC Type R

Torque
AC100V/200V

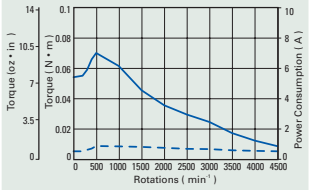
Power Consumption
AC100V
AC200V

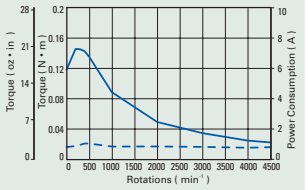


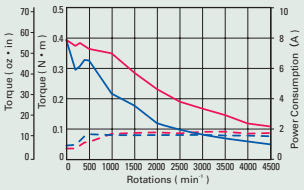
Motor Characteristics Chart DC Type M

Torque
DC24V
DC48V

Power Consumption
DC24V
DC48V

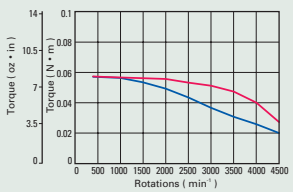


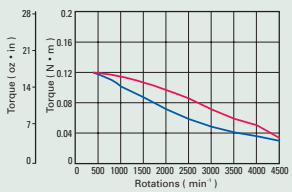


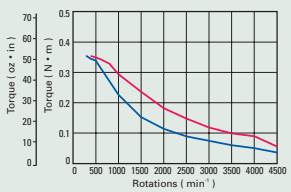


Motor Characteristics Chart DC Type R Multi Axis

Torque
DC24V
DC36V

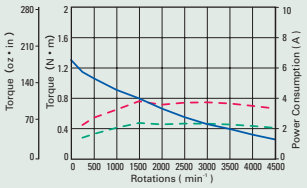


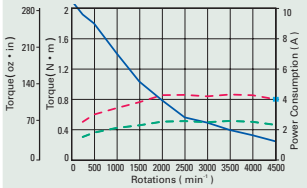


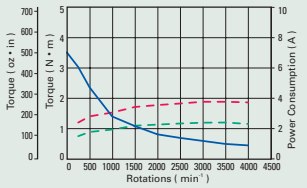


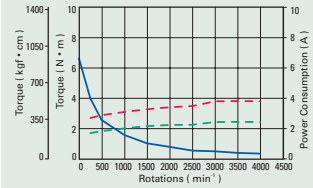
*Maintain motor case temperature at a point below 85℃ .
Note 1) The load point is determined at a position 14mm from the mounting surface.

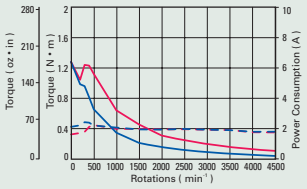
□60mm (□2.36in)		□86mm (□3.39in)	
70.3mm (2.77in)	102.3mm (4.03in)	85.5mm (3.37in)	116mm (4.57in)
PBM603FXE20	PBM604FXE20	PBM861FXE20	PBM862FXE20
PBAR603	PBAR604	PBAR861	PBAR862
PB3A003R200			
PBAP603	PBAP604	PBAP861	PBAP862
PB3A003P200			
PBM603FXE20	PBM604FXE20	—	—
PBDM603	PBDM604	—	—
PB3D003M200		—	—
PBM603DXA20	PBM604DXA20	—	—
PB2D003R1U△		—	—
1.3(184.09)	1.9(269.05)	3.3(467.30)	6.4(906.28)
0.4(2.187)	0.84(4.593)	1.48(8.092)	3(16.402)
14.7		60	60
167		200	200
0.85(29.98)	1.42(50.09)	1.9(67.02)	3.1(109.35)

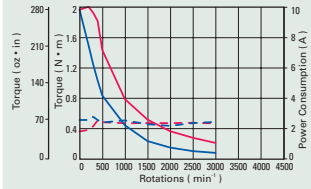


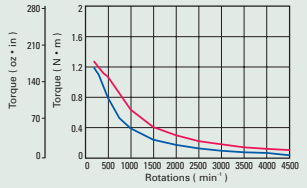


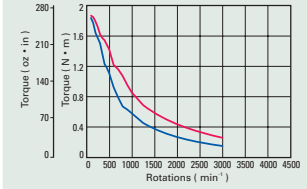












General Specifications

Low-backlash Gear Model

Motor Flange Size

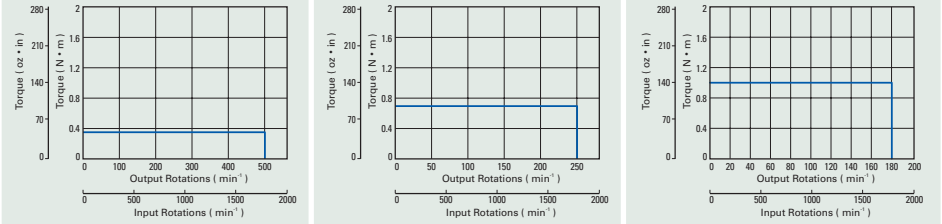
AC □42 (1.65in) □60 (2.36in)

DC □42 (1.65in) □60 (2.36in)

Size	Motor Flange Size	□42mm (□1.65in)		
	Motor Length +Gear Length	87.9mm (3.46in)		
Motor Model (A C)	Unit	PBM423FGAE20	PBM423FGBE20	PBM423FGEE20
Type R Set Model No.		PBAR423-C3.6	PBAR423-C7.2	PBAR423-C10
Related Amplifier Model No		PB3A003R200		
Type P Set Model No.		PBAP423-C3.6	PBAP423-C7.2	PBAP423-C10
Related Amplifier Model No		PB3A003P200		
Motor Model (D C)		PBM423FGAE20	PBM423FGBE20	PBM423FGEE20
Type M Set Model No.		PBDM423-C3.6	PBDM423-C7.2	PBDM423-C10
Related Amplifier Model No		PB3D003M200		
Motor Model (D C)		PBM423DGAA20	PBM423DGBA20	PBM423DGEA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N • m (oz • in)	0.343(48.57)	0.686(97.14)	0.98(138.77)
Rotor Inertia	$\times 10^{-4}$kg•m^2 (oz • in^2)	0.06(7.93)		
Reduction Gear Ratio		1:3.6	1:7.2	1:10
Backlash	DEG	0.6	0.4	0.35
Allowable Rotations	min^{-1}	500	250	180
Rotation Direction	Rel. to command dir.	Forward		
Allowable Thrust Load	N	15		
Allowable Radial Load Note 1)	N	20		
Motor Mass (Weight)	kg (oz)	0.48(16.93)		

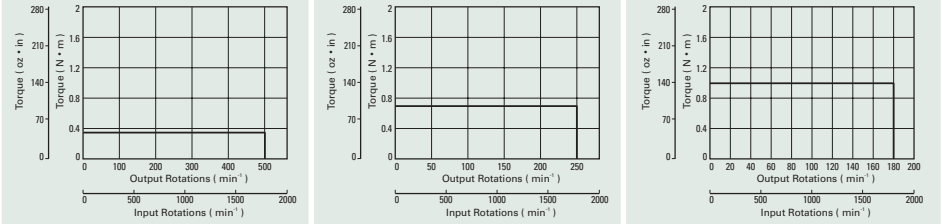
Motor Characteristics Chart AC Type R / AC Type P

Allowable Torque
AC100V/200V



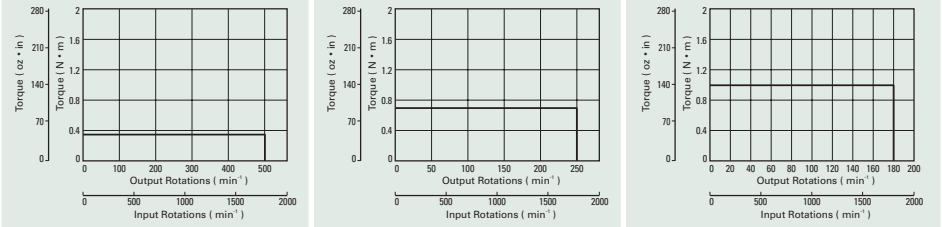
Motor Characteristics Chart DC Type M

Allowable Torque
DC24V
DC48V
DC24V/48V



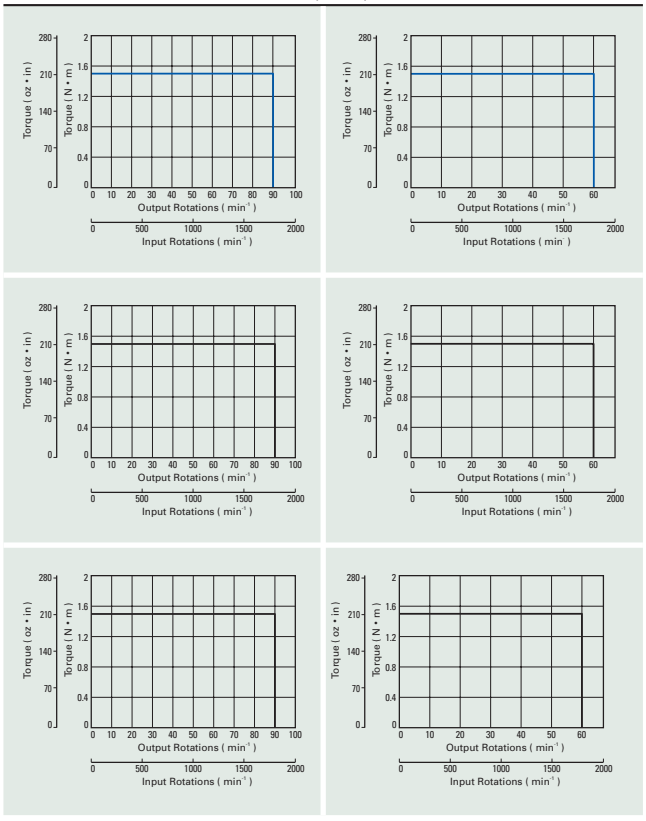
Motor Characteristics Chart DC Type R Multi Axis

Allowable Torque
DC24V
DC36V
DC24V/36V



*Maintain motor case temperature at a point below 85℃ .
Note 1) The load point is determined at a position 1/3 of the length from the output shaft.

□42mm (□1.65in)	
87.9mm (3.46in)	
PBM423FGGE20	PBM423FGJE20
PBAR423-C20	PBAR423-C30
PB3A003R200	
PBAP423-C20	PBAP423-C30
PB3A003P200	
PBM423FGGE20	PBM423FGJE20
PBDM423-C20	PBDM423-C30
PB3D003M200	
PBM423DGGA20	PBM423DGJA20
PB2D003R1U△	
1.47(208.16)	
0.06(7.93)	
1:20	1:30
0.25	
90	60
Reverse	
15	
20	
0.48(16.93)	



General Specifications

Low-backlash Gear Model

Motor Flange Size

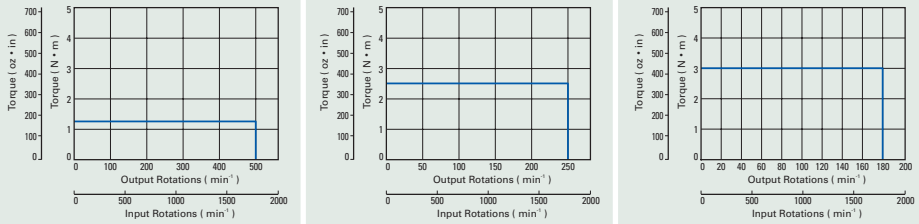
AC □42 (1.65in) □60 (2.36in)

DC □42 (1.65in) □60 (2.36in)

Size	Motor Flange Size	□60mm (□2.36in)		
	Motor Length +Gear Length	115.8mm (4.56in)		
Motor Model (A C)	Unit	PBM603FGAE20	PBM603FGBE20	PBM603FGEE20
Type R Set Model No.		PBAR603-C3.6	PBAR603-C7.2	PBAR603-C10
Related Amplifier Model No		PB3A003R200		
Type P Set Model No.		PBAP603-C3.6	PBAP603-C7.2	PBAP603-C10
Related Amplifier Model No		PB3A003P200		
Motor Model (D C)		PBM603FGAE20	PBM603FGBE20	PBM603FGEE20
Type M Set Model No.		PBDM603-C3.6	PBDM603-C7.2	PBDM603-C10
Related Amplifier Model No		PB3D003M200		
Motor Model (D C)		PBM603DGAA20	PBM603DGBA20	PBM603DGEA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N • m (oz • in)	1.25(177.01)	2.5(354.02)	3(424.82)
Rotor Inertia	$\times 10^{-4}$kg•m^2 (oz • in^2)	0.4(2.19)		
Reduction Gear Ratio		1:3.6	1:7.2	1:10
Backlash	DEG	0.55	0.25	
Allowable Rotations	min^{-1}	500	250	180
Rotation Direction	Rel. to command dir.	Forward		Reverse
Allowable Thrust Load	N	30		
Allowable Radial Load Note 1)	N	100		
Motor Mass (Weight)	kg (oz)	1.22(43.03)		

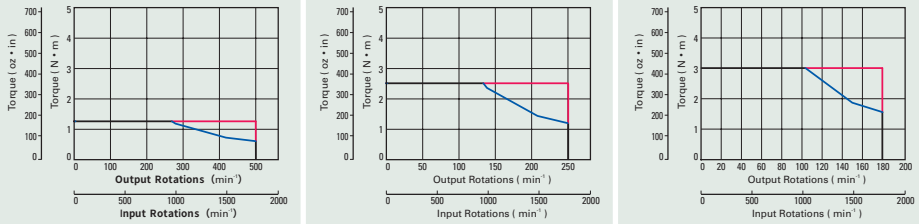
Motor Characteristics Chart AC Type R / AC Type P

Allowable Torque
AC100V/200V



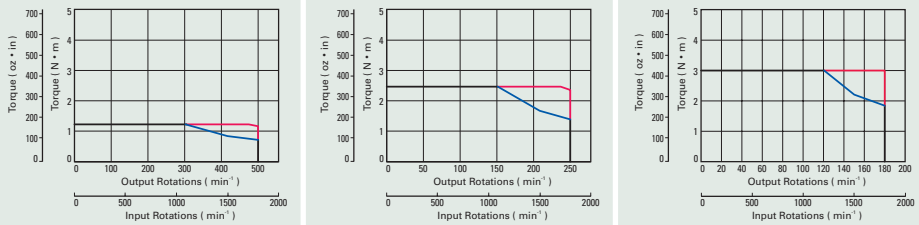
Motor Characteristics Chart DC Type M

Allowable Torque
DC24V
DC48V
DC24V/48V



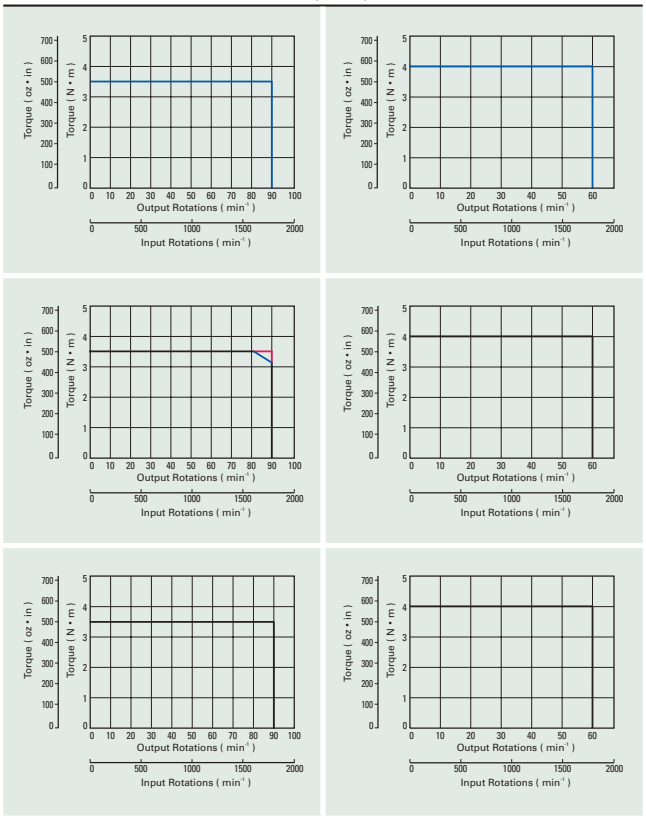
Motor Characteristics Chart DC Type R Multi Axis

Allowable Torque
DC24V
DC36V
DC24V/36V



*Maintain motor case temperature at a point below 85℃ .
Note 1) The load point is determined at a position 1/3 of the length from the output shaft.

□60mm (□2.36in)	
115.8mm (4.56in)	
PBM603FGGE20	PBM603FGJE20
PBAR603-C20	PBAR603-C30
PB3A003R200	
PBAP603-C20	PBAP603-C30
PB3A003P200	
PBM603FGGE20	PBM603FGJE20
PBDM603-C20	PBDM603-C30
PB3D003M200	
PBM603DGGA20	PBM603DGJA20
PB2D003R1U△	
3.5(495.62)	4(566.43)
0.4(2.19)	
1:20	1:30
0.17	
90	60
Reverse	
30	
100	
1.22(43.03)	



General Specifications

Spur Gear Model

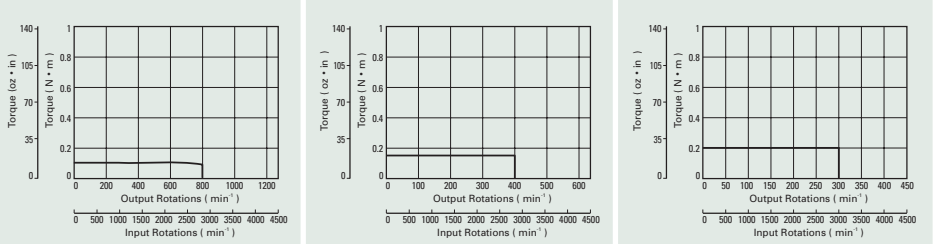
Motor Flange Size

DC 28 (1.10in)

Size	Motor Flange Size	□ 28mm (□ 1.10in)		
	Motor Length +Gear Length	88.5mm (3.48in)		
Motor Model (D C)	Unit	PBM282FGAE20	PBM282FGBE20	PBM282FGEE20
Type M Set Model No.		PBDM282-G3.6	PBDM282-G7.2	PBDM282-G10
Related Amplifier Model No		PB3D003M200		
Motor Model (D C)		PBM282DGAA20	PBM282DGBA20	PBM282DGEA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N • m (oz • in)	0.1(14.16)	0.15(21.24)	0.2(28.32)
Rotor Inertia	$\times 10^{-4}$kg•m^2 (oz • in^2)	0.02(0.09)		
Reduction Gear Ratio		1:3.6	1:7.2	1:10
Backlash	DEG	2		
Allowable Rotations	min^{-1}	800	400	300
Rotation Direction	Rel. to command dir.	Forward		Reverse
Allowable Thrust Load	N	10		
Allowable Radial Load Note 1)	N	15		
Motor Mass (Weight)	kg (oz)	0.22(7.76)		

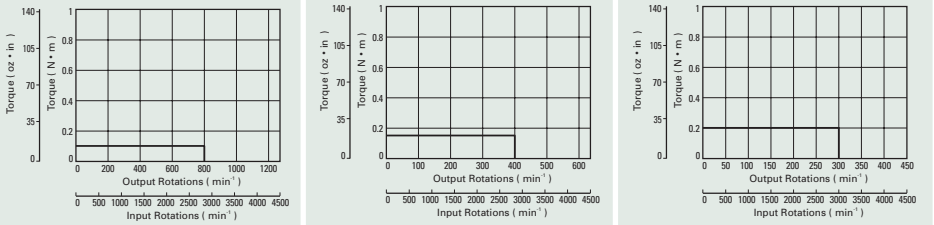
Motor Characteristics Chart DC Type M

Allowable Torque
DC24V
DC48V
DC24V/48V



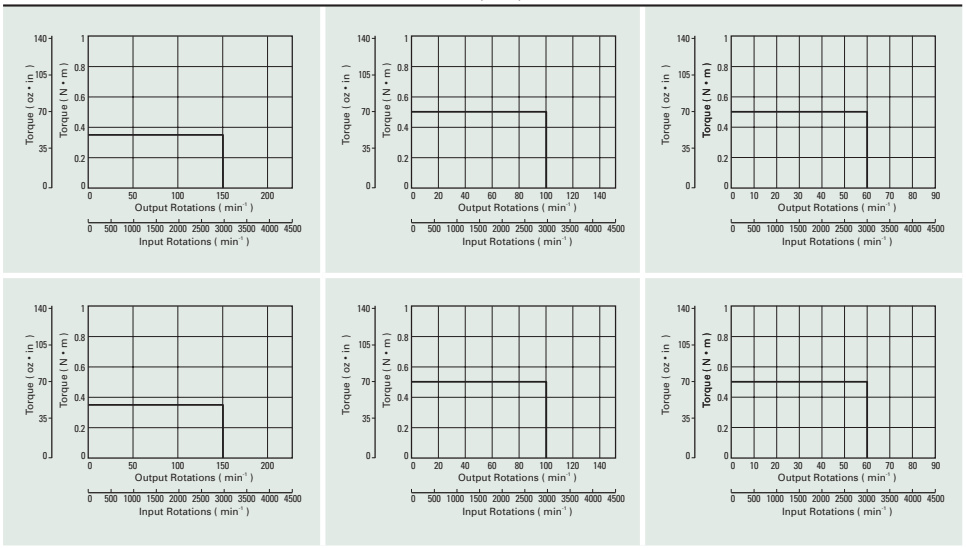
Motor Characteristics Chart DC Type R Multi Axis

Allowable Torque
DC24V
DC36V
DC24V/36V



*Maintain motor case temperature at a point below 85℃ .
Note 1) The load point is determined at a position 1/3 of the length from the output shaft.

□ 28mm (□ 1.10in)		
88.5mm (3.48in)		
PBM282FGGE20	PBM282FGJE20	PBM282FGLE20
PBDM282-G20	PBDD282-G30	PBDD282-G50
PB3D003M200		
PBM282DGGA20	PBM282DGJA20	PBM282DGLA20
PB2D003R1U△		
0.35(49.56)	0.5(70.80)	
0.02(0.09)		
1:20	1:30	1:50
1.5		
150	100	60
Forward		
10		
15		
0.22(7.76)		



General Specifications

Harmonic Gear Model

Motor Flange Size

AC □42 (1.65in) □60 (2.36in)

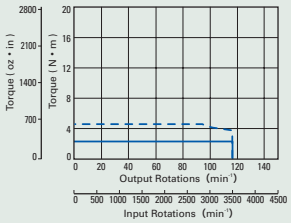
DC □28 (1.10in) □42 (1.65in) □60 (2.36in)

Size	Motor Flange Size	□28mm (□1.10in)		□42mm (□1.65in)
	Motor Length +Gear Length	97mm (3.82in)		
Motor Model (A C)	Unit	—	—	PBM423FHJE20
Type R Set Model No.		—	—	PBAR423-H30
Related Amplifier Model No		—	—	PB3A003R200
Type P Set Model No.		—	—	PBAP423-H30
Related Amplifier Model No		—	—	PB3A003P200
Motor Model (D C)		PBM282FHLE20	PBM282FHME20	PBM423FHJE20
Type M Set Model No.		PBDM282-H50	PBDM282-H100	PBDM423-H30
Related Amplifier Model No		PB3D003M200		
Motor Model (D C)		PBM282DHLA20	PBM282DHMA20	PBM423DHJA20
Type R Multi-axis Model No.		PB2D003R1U△		
Allowable Torque	N・m (oz・in)	1.5(212.41)	2(283.21)	2.2(311.54)
Allow. Instantaneous Torque	N・m (oz・in)	2.7(382.34)	3.6(509.79)	4.5(637.23)
Rotor Inertia	$\times 10^{-4}$kg・m^2 (oz・in^2)	0.01(0.066)		0.372
Reduction Gear Ratio		1:50	1:100	1:30
Lost Motion	min	0.4 to 3 (± 8.50oz・in)	0.4 to 3 (± 11.33oz・in)	—
Hysteresis Loss	min	—	—	3.6
Allowable Rotations	min^{-1}	70	35	116
Allowable Thrust Load	N	100		1150
Allowable Radial Load Note 1)	N	160		209
Motor Mass (Weight)	kg (oz)	0.27(9.52)		0.54(19.05)

Motor Characteristics Chart AC Type R / AC Type P

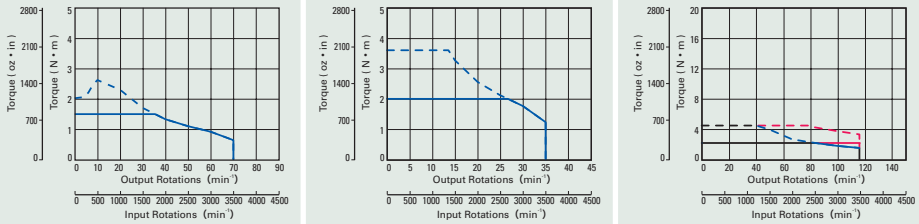
Allowable Torque
AC100V/200V ——

Allow. Instantaneous Torque
AC100V/200V - - - - - -



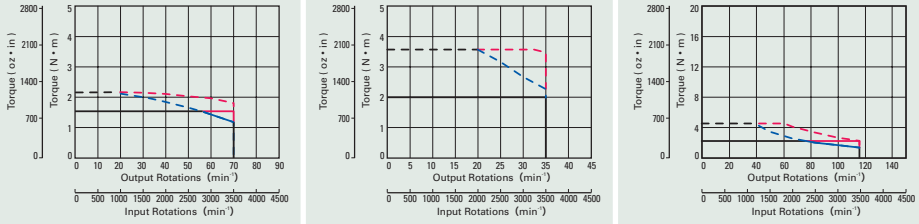
Motor Characteristics Chart DC Type M

DC24V ——
DC48V ——
DC24V/48V ——
Allow. Instantaneous Torque
DC24V - - - - - -
DC48V - - - - - -
DC24V/48V - - - - - -



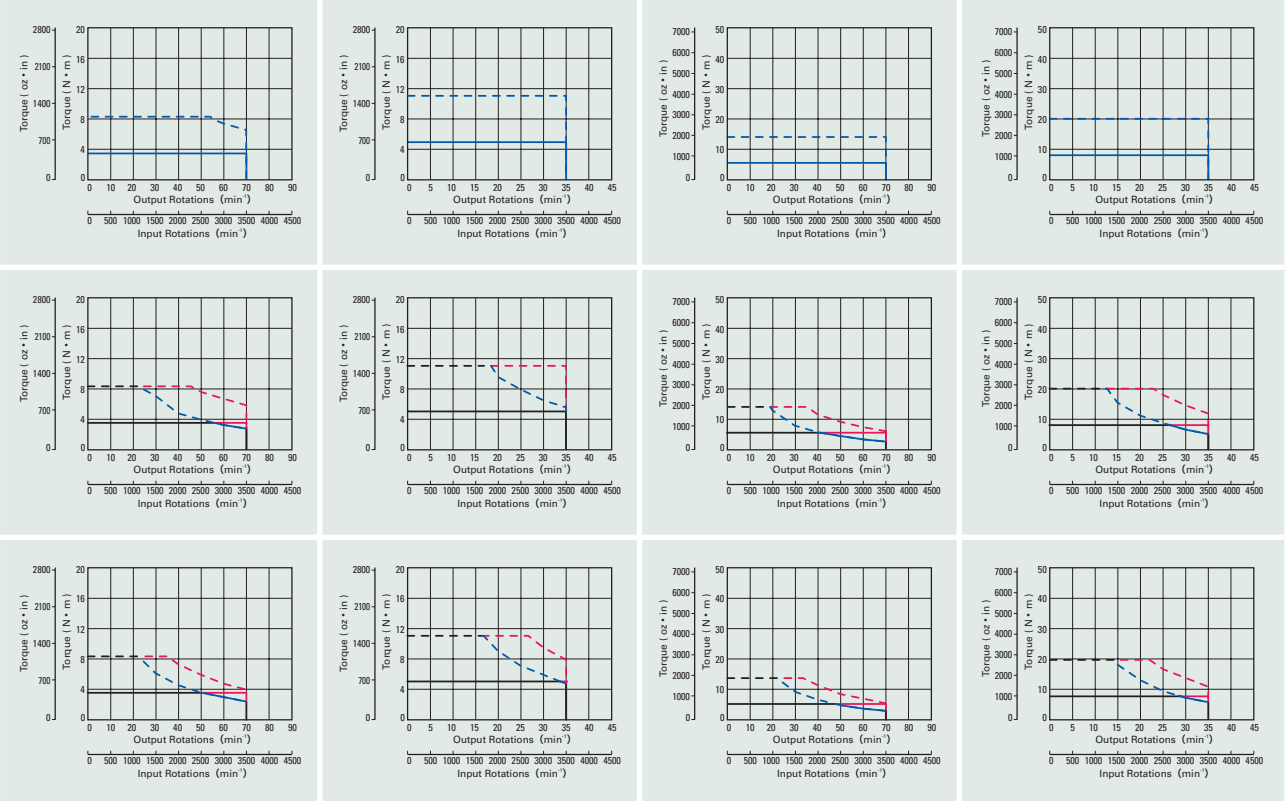
Motor Characteristics Chart DC Type R Multi Axis

Allowable Torque
DC24V ——
DC36V ——
DC24V+36V ——
Allow. Instantaneous Torque
DC24V - - - - - -
DC36V - - - - - -
DC24V/36V - - - - - -



*Maintain motor case temperature at a point below 85℃ . **The gear output shaft rotates in the opposite direction.
Note 1) The load point is determined at a position 1/3 of the length from the output shaft.

□42mm (□1.65in)		□60mm (□2.36in)	
97mm (3.82in)		137.3mm (5.41in)	
PBM423FHLE20	PBM424FHME20	PBM603FHLE20	PBM603FHME20
PBAR423-H50	PBAR423-H100	PBAR603-H50	PBAR603-H100
PB3A003R200			
PBAP423-H50	PBAP423-H100	PBAP603-H50	PBAP603-H100
PB3A003P200			
PBM423FHLE20	PBM423FHME20	PBM603FHLE20	PBM603FHME20
PBDM423-H50	PBDM423-H100	PBDM603-H50	PBDM603-H100
PB3D003M200			
PBM423DHLA20	PBM423DHMA20	PBM603DHLA20	PBM603DHMA20
PB2D003R1U△			
3.5(495.62)	5(708.03)	5.5(778.84)	8(1132.86)
8.3(1175.34)	11(1557.68)	14(1982.50)	20(2832.14)
0.07(0.372)		0.44(2.38)	
1:50	1:100	1:50	1:100
—	—	0.4 to 3 (± 39.65oz・in)	0.4 to 3 (± 56.64oz・in)
2.4	2.4	—	—
70	35	70	35
1150		400	
209		360	
0.54(19.05)		1.45(51.15)	



General Specifications

Electromagnetic Brake Model

Motor Flange Size

AC □42 (1.65in) □60 (2.36in)

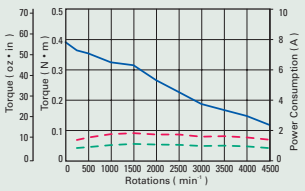
DC □28 (1.10in) □42 (1.65in) □60 (2.36in)

Size		Motor Flange Size	□ 28mm (□ 1.10in)		□ 42mm (□ 1.65in)
		Motor Length +Brake Length	97.8mm (3.85in)	117.1mm (4.61in)	90mm (3.54in)
Motor Model (A C)		Unit	—	—	PBM423FCE20
Type R Set Model No.			—	—	PBAR423-B
Related Amplifier Model No			—	—	PB3A003R200
Type P Set Model No.			—	—	PBAP423-B
Related Amplifier Model No			—	—	PB3A003P200
Motor Model (D C)			PBM282FCE20	PBM284FCE20	PBM423FCE20
Type M Set Model No.			PBDM282-B	PBDM284-B	PBDM423-B
Related Amplifier Model No			PB3D003M200		
Motor Model (D C)			PBM282DCA20	PBM284DCA20	PBM423DCA20
Type R Multi-axis Model No.			PB2D003R1U△		
MAX. Stall Torque		N • m (oz • in)	0.06(7.79)	0.12(16.28)	0.39(55.23)
Rotor Inertia		$\times 10^{-4}$kg•m^2 (oz • in^2)	0.01(0.04)	0.02(0.09)	0.06(0.31)
Allowable Thrust Load		N	9.8	9.8	9.8
Allowable Radial Load Note 1)		N	33	33	49
Motor Mass (Weight)		kg (oz)	0.28(9.88)	0.35(12.35)	0.5(17.64)
Electromagnetic Brake	Operation Method		No excitation actuating type		
	Power Voltage	V	DC24V±5%		
	Excitation Current	A	0.15		0.08
	Power Consumption	W	3.6		2
	Friction Torque	N • m (oz • in)	0.05(6.94)		0.22(31.15)
	Brake Engage Time	ms	20		
	Brake Release Time	ms	20		30

Motor Characteristics Chart AC Type R / AC Type P

Torque
AC100V/200V ——

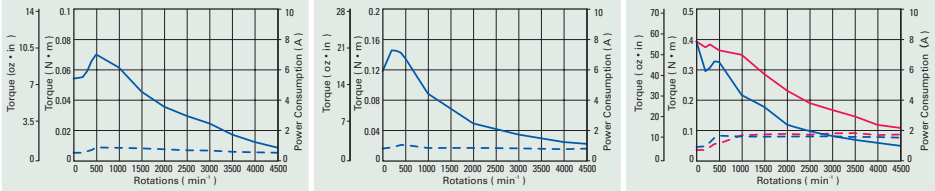
Power Consumption
AC100V ---------
AC200V ---------



Motor Characteristics Chart DC Type M

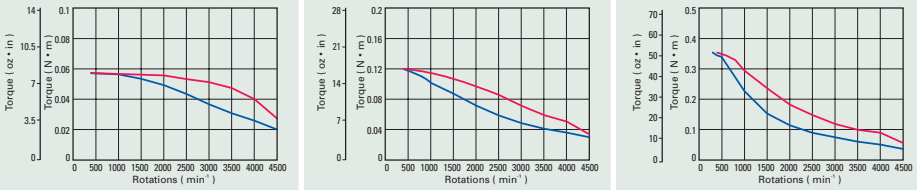
Torque
DC24V ——
DC48V ——

Power Consumption
DC24V ---------
DC48V ---------



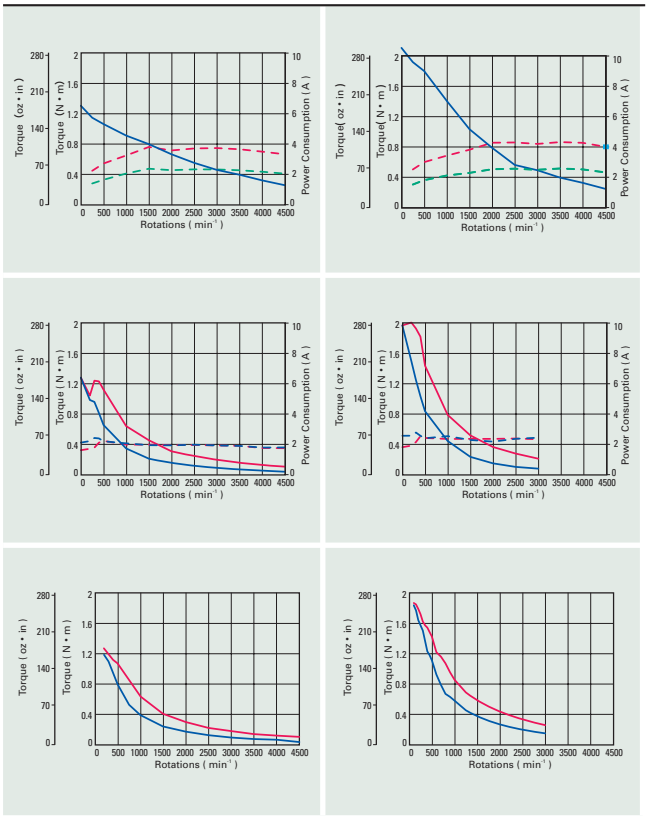
Motor Characteristics Chart DC Type R Multi Axis

Torque
DC24V ——
DC36V ——



*Maintain motor case temperature at a point below 85℃. Note 1) The load point is determined at a position 1/3 of the length from the output shaft.

□60mm (□2.36in)	
113.6mm (4.47in)	145.6mm (5.73in)
PBM603FCE20	PBM604FCE20
PBAR603-B	PBAR604-B
PB3A003R200	
PBAP603-B	PBAP604-B
PB3A003P200	
PBM603FCE20	PBM604FCE20
PBDM603-B	PBDM604-B
PB3D003M200	
PBM603DCA20	PBM604DCA20
PB2D003R1U△	
1.3(184.09)	1.9(269.05)
0.4(2.19)	0.84(4.59)
14.7	
167	
1.19(41.98)	1.76(62.08)
No excitation actuating type	
DC24V±5%	
0.25	
6	
0.78(110.45)	
20	
30	



Motor Dimensional Drawings

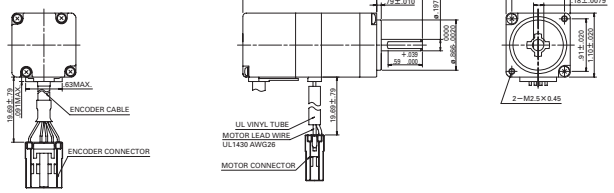
Unit : inch

□28mm (1.10inch) , □42mm (1.65inch) , □60mm (2.36inch)

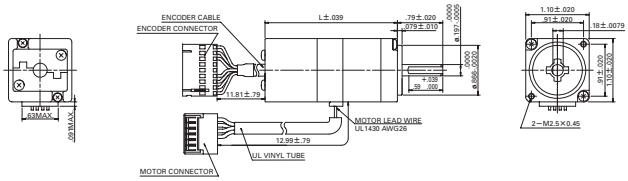
□ 28mm (1.10inch)

● Standard Model

PBM282FXE20 DC
PBM284FXE20 DC



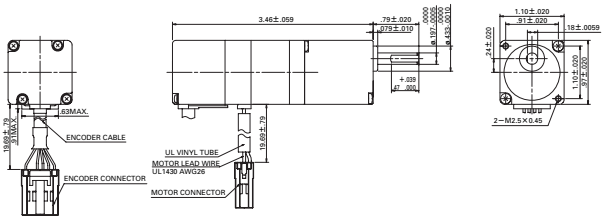
PBM282DXA20 DC Multi Axis
PBM284DXA20 DC Multi Axis



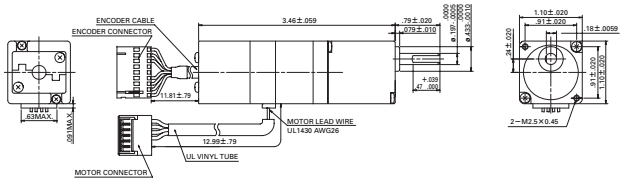
MODEL	L
PBM282	2.30
PBM284	3.06

● Spur Gear Model

PBM282FG □ E20 DC

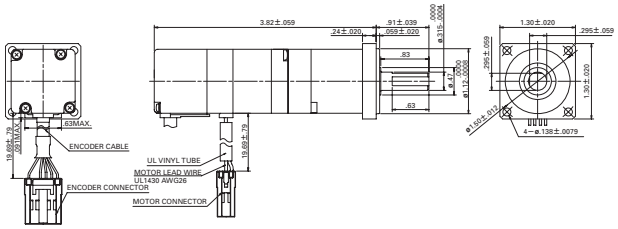


PBM282DG □ A20 DC Multi Axis

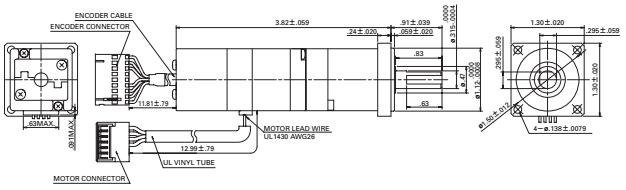


● Harmonic Gear Model

PBM282FH □ E20 DC

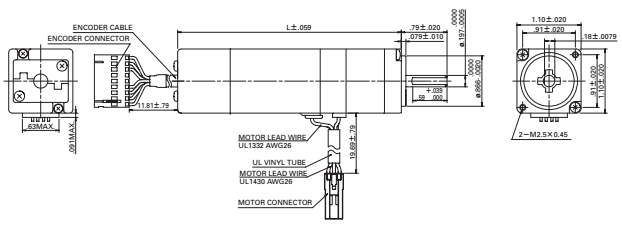


PBM282DH □ A20 DC Multi Axis

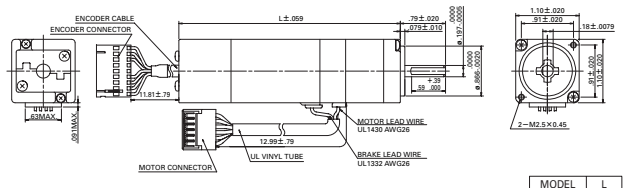


● Electromagnetic Brake Model

PBM282FCE20 DC
PBM284FCE20 DC



PBM282DCA20 DC Multi Axis
PBM284DCA20 DC Multi Axis



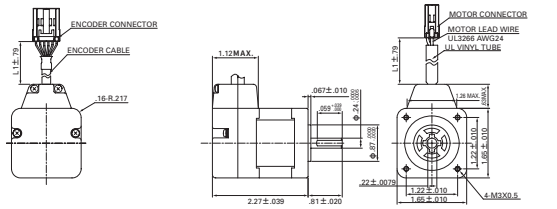
MODEL	L
PBM282	3.85
PBM284	4.61

☐ 42mm (1.65inch)

● Standard Model

PBM423FXE20 AC DC

PBM423DXA20 DC Multi Axis

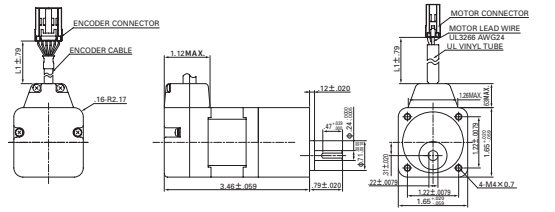


MODEL	L1
PBM423FXE20	19.69
PBM423DXA20	11.81

● Low Backlash Gear Model

PBM423FG ☐ E20 AC DC

PBM423DG ☐ A20 DC Multi Axis

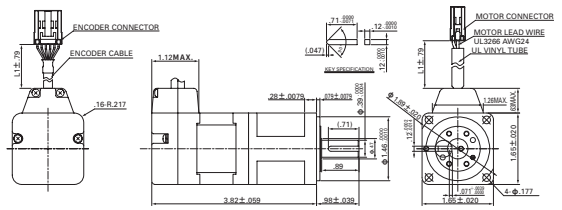


MODEL	L1
PBM423FG ☐ E20	19.69
PBM423DG ☐ A20	11.81

● Harmonic Gear Model

PBM423FH ☐ E20 AC DC

PBM423DH ☐ A20 DC Multi Axis

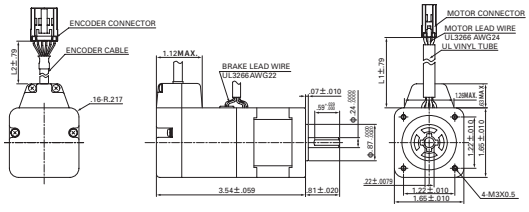


MODEL	L1
PBM423FH ☐ E20	19.69
PBM423DH ☐ A20	11.81

● Electromagnetic Brake Model

PBM423FCE20 AC DC

PBM423DCA20 DC Multi Axis



MODEL	L1	L2
PBM423FCE20	20.28	19.69
PBM423DCA20	12.40	11.81

☐ 60mm (2.36inch)

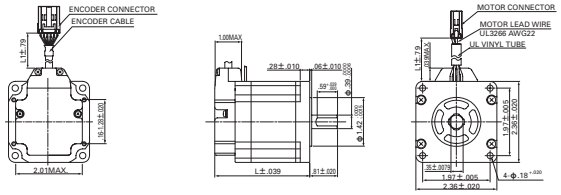
● Standard Model

PBM603FXE20 AC DC

PBM604FXE20 AC DC

PBM603DXA20 DC Multi Axis

PBM604DXA20 DC Multi Axis

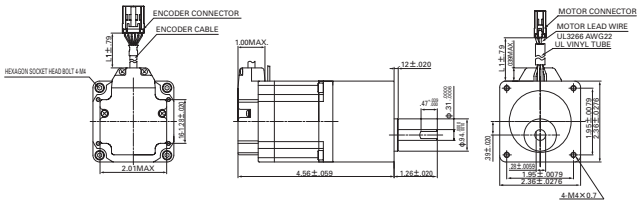


MODEL	L	L1
PBM603FXE20	2.77	19.69
PBM604FXE20	4.03	19.69
PBM603DXA20	2.77	11.81
PBM604DXA20	4.03	11.81

● Low Backlash Gear Model

PBM603FG ☐ E20 AC DC

PBM603DG ☐ A20 DC Multi Axis

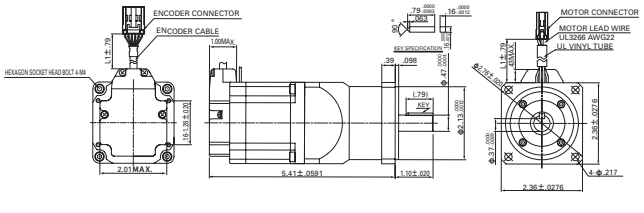


MODEL	L1
PBM603FG ☐ E20	19.69
PBM603DG ☐ A20	11.81

● Harmonic Gear Model

PBM603FH ☐ E20 AC DC

PBM603DH ☐ A20 DC Multi Axis



MODEL	L1
PBM603FH ☐ E20	19.69
PBM603DH ☐ A20	11.81

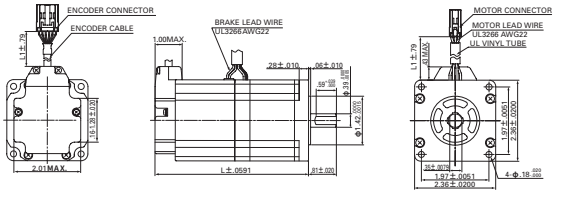
● Electromagnetic Brake Model

PBM603FCE20 AC DC

PBM604FCE20 AC DC

PBM603DCA20 DC Multi Axis

PBM604DCA20 DC Multi Axis



MODEL	L	L1
PBM603FCE20	4.47	19.69
PBM604FCE20	5.73	19.69
PBM603DCA20	4.47	11.81
PBM604DCA20	5.73	11.81

Motor Dimensional Drawings

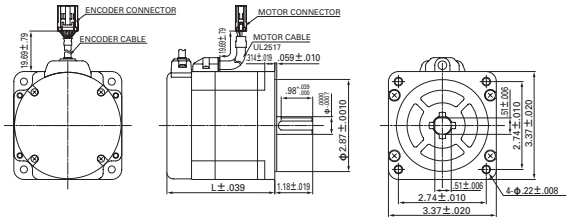
Unit : inch

□86mm (3.39 inch)

□ 86mm (3.39inch)

● **Standard Model**

PBM861FXE20 AC
PBM862FXE20 AC



MODEL	L
PBM861FXE20	3.37
PBM862FXE20	4.57

□Connector Specification Of Motor Side

AC DC

Encoder Connector

Housing : 1-1318118-6
Terminal : 1318106-1
Manufacturer : AMP

Connector Connection Of Encoder Side

PIN No.	LEAD COLR	
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	—
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	—

Encoder Cable : UL20276

Motor Connector

Housing : 1-1318119-3
Terminal : 1318105-1
Manufacturer : AMP

Connector Connection Of Motor Side

Standard Model, Low Backlash Gear Model, Harmonic Gear Model

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	N.C.	—
B3	N.C.	—

Electromagnetic Brake Model

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	Brake +	Brake Lead Wire
B3	Brake −	Brake Lead Wire

DC Multi-axis

Encoder Connector

Housing : 51030-0930
Terminal : 50083-8070
Manufacturer : MOLEX

Connector Connection Of Encoder Side

2 Channel

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	N.C.	—
6	N.C.	—
7	Red	+5V
8	Black	0V
9	Black	FG (Shield)

Encoder Cable : UL20121

(3 Channel)

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	FG (Shield)

Encoder Cable : UL20276

Motor Connector

Housing : 5111-0610
Terminal : 50397-8000
Manufacturer : MOLEX

Connector Connection Of Motor Side

Standard Model, Low Backlash Gear Model, Harmonic Gear Model

PIN No.	LEAD COLR	
1	Blue	Motor Lead Wire
2	Orange	Motor Lead Wire
3	Red	Motor Lead Wire
4	Yellow	Motor Lead Wire
5	N.C.	—
6	N.C.	—

Electromagnetic Brake Model

PIN No.	LEAD COLR	
1	Blue	Motor Lead Wire
2	Orange	Motor Lead Wire
3	Red	Motor Lead Wire
4	Yellow	Motor Lead Wire
5	Brake +	Brake Lead Wire
6	Brake −	Brake Lead Wire

❑PC Interface Description

PC Interface Software Display Screens

1:Program Input Screen

2:Point Input Screen

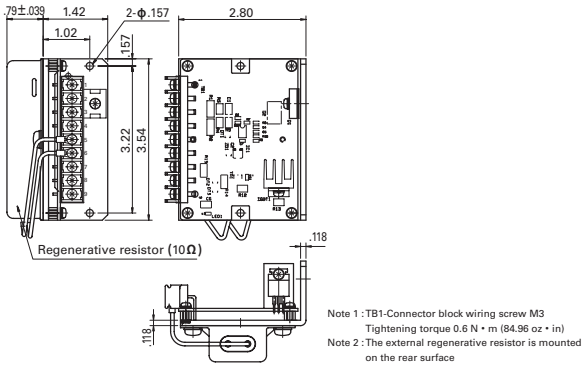
3:Parameter Input Screen

PB-R PC Interface Software Functions

■ Functions
Direct command capability
Point data editing/execution
Program data editing/execution
Current position/Alarm/Amplifier status monitoring
Lead Pitch Conversion
Off-line Editing
Teaching Function, etc

■ Program Functions
Various branching conditions (Position, Input Port, Direct, Motor Stop)
Timer Wait
Subroutine Structure
Loop Counter, etc.

Regenerative Unit (DC For Type R Multi-axis) (Unit:inch)
Model : PBFE-01



Note 1 : TB1-Connector block wiring screw M3
Tightening torque 0.6 N • m (84.96 oz • in)
Note 2 : The external regenerative resistor is mounted on the rear surface

■ Precautions For Adoption

⚠ Cautions

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances,could lead to a serious accident.
Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The amplifiers presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

＊For any question or inquiry regarding the above, contact our Sales Department.

http://www.sanyodenki.com

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*Remarks : Specifications Are Subject To Change Without Notice.

CATALOG NO. 845-1 '07.4.N